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ABSTRACT

This analysis, a review of literature and experience on performance-based education, is divided into nine chapters: chapter one, "The Short Form: Best-Guess Working Hypotheses for Competency-Based Education" (a summary of the frame of reference for this study and the recommendations for performance-based education which resulted from the effort); chapter two, "Performance-Based Education: Overview and Definitions"; chapter three, Origins: Where Did Competency-Based Education Come From?" (a brief history of its development in military training, cybernetic psychology, programs for children, and applications to teacher education); chapter four, "Innovation and Competency-Based Teacher Education"; chapter five, "The Bureau of Research Models: The Application of the Systems Approach"; chapter six, "The Model of the Teacher: Is a Generalist a Set of specialists?" chapter seven, "The National Teaching Style: The Target of Teacher Education" (a brief analysis of the objective studies of teaching); chapter eight, "What Would Be the Nature of a Comprehensive, Competency-Based Teacher Education Program?" and chapter nine, "What Would Be the Nature of a Competency-Based Teacher Center?" The appendix, "The Enormous Software Problem," consists of a review of available performance-based teacher education materials. The appendix is divided into seven sections. (Author/JA)

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The Promise of Performance (Competency)-Based Education: An Analytical Review of Literature and Experience

by Bruce R. Joyce
Teachers College, Columbia University

September, 1971

U. S. DEPARTMENT OF
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Performance-oriented education depends on the development of instructional materials.

The appendix consists of a review of presently-available performance-based teacher education materials which was prepared for the Teacher Corps under the title *Materials for Modules* by Bruce R. Joyce, Marsha Weil, Greta Morine, and Rhoada Wald.

This report was prepared during the late summer of 1971 with the assistance of many people from Teachers College, especially Marsha weil and Rhoada Wald, and my colleagues in New London, Pennsylvania, Betsy Joyce and Jean Botts.

Most of Chapter Five consists of material prepared under Grant No. OEG-070-4726 and the Appendix consists of materials prepared under a contract with the National Teacher Corps. The remainder of the material was entirely prepared during this study.

Because of the large size of the literature reviewed, the bibliography has been divided into seven sections, each numbered consecutively. References are given in terms of a letter (A-G) referring to the section, and a number referring to the entry. Hence, a reference designated as B-4 would refer to section B of the bibliography, the fourth entry.

New London, Pa.
Labor Day, 1971

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Chapter One

The Short Form: Best-Guess Working Hypotheses for Competency-Based Education

by

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Given the confusion that attends the development and publicization of any fad or trend, how do we get perspective on it, determine its worth, decide how to use it, and shape it for maximized payoff?

The case of competency-based education is not unique in the history of educational trends except that it is more technical than any previous general movement in education, and it represents an attempt to manage education (bring it under the direct control of the policy-maker) more than to influence its goals or methodology.

Definitions (See Chapter Two)

Management is the watchword of competency-based education. It assumes that one can have clearly defined educational goals, relate them to precise and direct means, and monitor the process so as to determine its effects and revise the program intelligently. The competency-based stance includes behaviorism--the practice of defining human capacity in terms of observable behavior. It includes a preference for direct educational methods--those that achieve changes in behavior by inducing the client to practice the new pattern. Even more characteristic is the stance that complex functionaries (as teachers, military commanders, quarterbacks) can be conceptualized as a system of related behaviors (a model) related to an environment (a system of sub-systems) and that this model can be analyzed into component behavior-streams which can be developed by direct training procedures.

Competency-based education of teachers is the stance that the teacher can be conceptualized as a system of observable behaviors which can be directly trained and assessed.

History (See Chapter Three)

Military training needs in the Second World War and after resulted in the rise of very pragmatic procedures for designing training systems which employed extremely direct methods and precise assessment measures employed at frequent intervals to relatively short training units. Training psychology proved to be effective in preparing persons to fill a wide variety of complex roles to demanding standards under conditions of stress.

Cybernetic psychology added the practice of conceptualizing human operations as models of communication and information-processing systems operating as sub-systems of a complex environment. The process of conceptualizing human roles in terms of models operating within model environments gave rise to the creation of simulators as training devices which combined the advantages of realism (high transferability) and control of task complexity (high sequenceability) in the design of training systems.

Experience in public education has been largely linked to technological innovation. Language laboratories, programmed instruction, television systems, and I.P.I. have all been applications of the competency stance which have had positive results. (A)

Experience in teacher education has largely been technology or product-linked also. The work by Allen and associates, Flanders and associates, Cruickshank, Dodd, Cooper, Kersh, Davis, (D) and others has produced positive results with respect to the teaching of teaching skills. The recent work of Joyce, Weil, Wald, and Gullion has provided evidence that it is possible to train teachers to employ a variety of complex models of teaching which are strikingly different from normal classroom behavior.

The Bureau of Research Teacher Education Project provided application of the stance to the systematic planning of teacher education programs. The results of the effort suggest that the competency-oriented stance embraces a wide variety of approaches to the conceptualization of the teacher and strategies for his training. (See Chapter Five)

The systems planners, in attempting to conceptualize the teacher and his training, operated in accordance with the findings of the recent reform movements in public education--that it takes a convergence of changes, in technology, staff-utilization and training, and curriculum, accompanied by strong leadership, to bring about more than a fleeting change in an educational institution.

The systems planners also followed steps which represent the state-of-the art in the field, steps which constitute the process of planning competency-based teacher education.

The Process

1. The creation of a "working model" of the teacher, described as interrelated sets of competencies and as a subsystem of the relevant larger environment in which the teacher works (teams, schools, communities, support systems, etc.). The model must "really work." A collection of competencies

that do not fit together into an effective performance model is not an adequate program objective.

2. The analysis of this model into streams of related competencies that can form the basis of components of the training system.
3. The selection of component strategies and the development of specifications for components.
4. The creation of the overall training system, especially interlocking relationships among components, support systems, and communication systems.
5. The organization of management systems to monitor progress, program elements, and program testing and revision.
6. The reconciliation of the program with the client (student) and the field (educational system). (This is not a step to be done after the others, but must be accomplished in various ways which are synchronized to the other steps.)

The result of these steps is a modular training system whose elements can be matched to the achievement profile and characteristics of the teacher candidates.

The precision in training which results from this process should be very high. The reason for this can be seen by focusing on three characteristics of the resultant program:

1. A storage and retrieval system of assessment elements which can be used to obtain a precise estimate of candidate competence and progress.
2. A storage and retrieval system of behavioral competency descriptions matched with program elements (modular) for achieving them.
3. A management system for relating (1) and (2) so that training can be closely matched to candidate needs.

These same features provide the potential for a very high degree of program individualization and personalization.

The implementation of such a program depends on the development of a vast quantity of software. Competencies have to be specified (the Bureau of Research projects each contained 2,500 or more with much remaining to be done). Instructional materials have to be created (the largest bulk job). Assessment devices and a management support material have to be prepared. (See Appendix)

Without the production of high-quality software there will be no competency-based teacher education. This point should not be minimized. If it is not taken seriously, the following dilemmas will develop:

1. The creation of competency-based certification standards without the capacity to assess adequately or remedy a deficiency once it is found. (Several states are currently heading straight into this dilemma.)
2. The placing of the teacher in a position where he is expected to be competent but has no training reservoir to turn to to improve himself. (Some forms of the accountability movement are creating this dilemma by pressuring the teacher to show pupil achievement gains but not providing precise training for him so he can increase his capacity.)

A comprehensive training program which links the preservice and inservice levels is necessary to assure both continuous assessment and equal ability to meet training needs. (See Chapter Eight)

Teacher Centers (See Chapter Nine)

If the systems-planning technology described above is applied to the development of a "teacher center" it will have the following characteristics:

1. A description of one or more models of the teacher broken down into related sets of competencies.
2. A modular training training system related to those competencies.

3. A diagnostic system which enables the teacher to compare his performance with the modeled behavior and determine areas of strength and weakness.
4. A management system which permits the teacher to relate himself to the training system in light of the diagnosis.
5. A linkage to schools which permits the teaching center to function so as to: (a) improve the present mode of operation of the schools or (b) to mesh with changes in curriculum, staff-utilization, and preferred models of teaching to bring about a new educational environment.

There is considerable evidence that the convergence of forces identified in 5a and 5b is requisite to training effectiveness. One cannot successfully train a teacher to one model and then give him a job which demands another or inhibits the performance of the one. Nor, conversely, can one bring about innovation without including performance-based training of the teacher as one of the main thrusts of energy. (See Chapters Four, Six, and Seven).

As in the case of a comprehensive competency-based teacher education program, a teacher center is dependent on the development of software to permit implementation of diagnosis, training, and management. Without software, a teacher center will not differ appreciably from the inservice workshops of the past.

The Direction of Education

Because the creation of competency-based teacher education programs and teacher centers is an expensive process and, probably more important, because it promises to be powerful provided it is accompanied by changes in staff-utilization, curriculum, and materials of instruction, it must be aimed carefully.

Increasingly, software is being developed. See: Materials for Modules, appended.

As far as we now know, competency-based education can be applied to a wide variety of quite different conceptions of the teacher. (See Chapters Five and Six)

Apparently, then, the designer of a competency-based teacher education program can choose one or more from the available models of teaching that reflect differing educational theories. Will one choose the teacher of Carl Rogers, B. F. Skinner, John Dewey, John Holt, A. S. Neill, David Ausubel or--who?

The selection of the model constitutes an explicit selection of an educational stance, for the teacher's behavior gives life to one or more of the possible modes of education, and the choice among them should be a conscious one.

The Generalists As a Set of Specialists

A related choice involves the question, "Can we train a general functionary called a teacher or does each educational model require a new set of competencies?" My view is that the soundest procedure at present is to view each model of the teacher as unique and to train for specialized models rather than for generalized competency. The generalist of the past has had great difficulty adapting to new models of education--he has been unable to implement innovative teaching strategies and technologies. Thus it seems best for the present to conceive of a generalized model as a set of specialized models and to define competence in terms of specific educational practices. (See Chapter Six)

Chapter Two

Performance-Based Education: Overview and Definitions

Whenever a new trend begins to establish itself in a field like education, it generally happens that a few slogans become established in the public consciousness, and the trend becomes known by those slogans. Our present subject is "Performance-Based" or "Competency-Based" education, especially as it applies to the training of professional educators. As in the case of other trends, the slogans have rapidly acquired many meanings, and it is necessary for us to establish a definition which will embrace the current usages sufficiently to allow us to unify the literature and, at the same time, be precise enough to permit us to identify working concepts that can be acted on in the real world.

As contrasted with other stances toward education, performance-based and competency-based education have in common their espousal of direct and definite ends and means rather than general, indirect or indefinite ends and means. At the elementary and secondary school levels, Popham's (E-95) study of teachers' ability to identify behavioral objectives dramatizes the issue. Popham asked a large quantity of teachers to distinguish between objectives which were more or less behavioral according to the definitions of behaviorality commonly used by social scientists. He found that many of the teachers were unable to distinguish behavioral from nonbehavioral objectives; and when he compared them with a random group of citizens, the citizens, untrained in education, were at least as good as the teachers and, in some cases, better at identifying behavioral objectives. Do Popham's findings mean that teachers cannot engage in an act which we might call teaching? Probably not, although some might argue the point. What it means is that teachers, generally speaking, use general and indirect methods which are not precisely aimed toward specific goals. They are not, in other words, engaged in competency-based education.

Given the general mode of operation of most schools, this should not be surprising because most instruction in schools is group instruction. When one becomes precise in setting and achieving behavioral objectives, he very quickly becomes dissatisfied with group instruction because very few individuals in a group are "ready" for any given instructional objective at the same time. The more precise one becomes, the less satisfactory group instruction in self-contained classrooms or departmentalized organizations becomes. Consequently, when one becomes much more specific about what one wants to achieve and how he wants to go about it, one begins to define very specifically the competencies or performances he wants the student to manifest, and he tends to devise instructional support systems that make it possible to individualize instruction. To this date, the Individually Prescribed Instruction system developed at the University of Pittsburgh Research and Development Center is the most prominent example of a competency-based curriculum developed for the public schools. I.P.I., as presently constituted, consists of instructional systems in reading and arithmetic--each system containing thousands of instructional units or modules, each one related to a particular instructional objective and an overall system related to a diagnostic and evaluation system which permits a precise tracking of the progress of whatever number of individuals are relating to the system.

In contrasting the teacher using general methods aimed at general objectives with the instructional system comprised of very specific and definite methodologies directed at very specific and clearly-defined objectives, we find the essence of the nature of competency-based instruction as it is distinguished from more familiar forms of teaching.

It should not be assumed, however, that performance-based or competency-based instruction cannot take place in groups. For the reasons mentioned before, a competency-based education is more than likely to consider the merits of individualization, but precision of methods and objectives is the hallmark not a strategy of individualization qua such.

Precision and Teacher Education

We can make the same distinction at the higher education level between general aims and general methodologies and specific aims and specific methodologies. For most of this century, teacher education has consisted of general means: courses in the foundation of education, educational psychology, methodology, and apprenticeship or student teaching; and these have been aimed at general goals. The student was generally not taught specifically how to use a learning theory to solve its instructional problems, but rather there was a belief that if the teacher knew a good bit about learning theories that these would aid him as he came to try to solve instructional problems in the classroom. General knowledge of learning theories would be part of his available equipment for problem solving. Similarly, his knowledge of educational philosophy gained in the social foundations courses would help him comprehend more fully what he was about and understand his historical position. No one would, however, expect that a student would use an element of educational philosophy in a particular way with a particular learner in a particular classroom. Educators who are oriented toward the competency stance, however, wish to make the business of teacher education a great deal more precise than that. They hope to make a systematic analysis of the particular behaviors that a teacner will need in order to solve his problems and then to provide him with a specific and specialized training to enable him to arrive at those competencies and to use systematic evaluation devices to determine his ability to manifest those behaviors under realistic conditions.

The characteristics of the Bureau of Research Teacher Education Program models for teacher education (G) illustrate that to apply precision to the definition of a complex functionary like a teacher is in itself a complex process. The "systems models," when fully complete, can be expected to have upwards of 3,000 behavioral objectives in each one of them, each objective describing a particular competency of the teacher.

From my perspective, therefore, the distinguishing characteristic of competency-based training is precision in ends and means and, therefore, comprehensiveness and specificity in planning all aspects of the educational program. The competency stance is not the possession of a particular belief in a particular kind of teacher as the goal of the teacher education program. A person can be competency-oriented and embrace any type of end and any type of means so long as those can be precisely planned. He does uses the tools of the positivist and the systems analyst to make his ends and means clear. If it eventually turns out that to embrace positivism requires the rejection of certain kinds of educational means, then the competency-oriented educational planner will indeed limit his repertory somewhat. I see no evidence of this at this time, however. Sensitivity trainers, Rogerian psychologists, Freudians, inquiry trainers, and behavior modification advocates all seem apparently able to live under the roof of competency-based education.(F)

If I am not mistaken in this, it means that quite a large number of types of conception of the teacher and ways of training him can be developed under the rubric of competency-based education. The components of the systems models lend support to this notion in the wide range of component types that were included among them. Gestalt therapy techniques were applied in the Massachusetts Model to the development of human relations skills and a more adequate self-conception on the part of the teacher. The Syracuse Model included sensitivity training and reflective counseling techniques. The Northwest Regional Laboratory (G-5) employed simulation extensively. The models represented, in fact, a much greater diversity of training methods than are employed in present-day teacher education programs.

Thus we can accept, for the time being, the notion that systematic performance-oriented conceptions of teacher education can subsume a very wide variety of types.

Probably the same thing is true of the education of young children, although the range of developed approaches has by no means been as exhaustive as we might imagine. Thus far, I.P.I. has been applied to reading and to arithmetic, and there are some plans to apply it to the social studies area as well. Language laboratories have for years been performance-oriented and have been organized according to behavioral ladders of achievement in terms of competency to speak the language. Programmed human relations courses are now available for secondary schools. The Tri-University Project at the University of Washington has attempted to develop social studies competencies for children in a form that can be used to guide systematic, systems-based curriculum development in that area.

At any rate, if we make the assumption that the performance-oriented stance is a relatively value-free technology with respect to the ends and means of education which can be related to it, we can ask the most stringent series of questions about its nature, about the evidence concerning the effects of using it, and consider how it can be used to create a wide variety of types of education for children and teachers alike.

battle, or transport where pilot competence was crucial. On him depended the safety of the crew and the airplane and the success of the missions which were to be flown. A second condition was that these personnel had to be trained very rapidly. Especially at the beginning of the Second World War there were very few qualified people in existence, and large numbers were needed very rapidly in the face of a deteriorating war situation.

These needs (precision and speed) of military training contrast radically with the needs of most educational institutions. Up to that point, universities and schools had been leisurely and general, for the most part. Most educators and psychologists who had been concerned directly with education focused on the problems of the individual learner and his affective responses to training. Thus they tended to focus on educational strategies which gave the student an opportunity to develop himself on his own terms and which paid maximum attention to his need structures and his emotional responses to the training that he was to undergo. Thus most of the fairly well-developed teaching strategies up to about 1940, with the exception of operant conditioning (which had not been applied widely to education) were fairly indirect, general methods which presented a very soft face to the learner so as not to control him overly. The basic methods of the Progressive Movement, (Cremin, 1961)(E-27) for example, gave the learner considerable opportunity to develop himself by sharing in the creation of his own educational goals and means. This method was leisurely and general and was not calculated to achieve specific outcomesly focused training. Similarly, the methods which developed out of the Child Study Movement paid considerable attention to the way the learner felt about himself, were concerned with facilitating his personal growth, and, as in the case of the progressive methods, gave him his maximum opportunity to develop himself.

The urgency of war conditions took attention away from the needs of the learner and toward the need for precise and rapid training which considered the learner chiefly in terms of his capacity to respond to the training and his ability to hold himself together during a rather arduous training process. The psychologists who created the training systems soon came to believe that much of what had been learned from psychology was of very little use when it came to developing a training system.

Gagne's famous essay was very direct on this point. (Gagne, A-34) It instituted a plea, advocation of the rough parodigm that came to characterize activities of the trainers. Essentially this scheme, which is paraphrased below, was arrived at by teams of people who worked on widely different types of training programs but which faced the same problems of the need for a rapid training system to yield fairly certain results or recycle or reassign the trainee if progress was not being made. The four steps are:

1. The identification of the program goal in terms of sets of specific behavioral elements which fit together to define the competency of the trainee at the end of the training program. (When this is applied to the education of the teacher, we refer to the goal as the "model" of the teacher.) (Joyce, 1971)(F) For example, the task of the pilot is defined in very specific, interrelated behavior streams even though very complex operations are involved. Specificity and relatedness of behavioral elements are essential.
2. The organization of these behavioral elements into coherent units or groups which could form sequenced streams for training. Again in the case of the pilot, some of his activities involve communication to other members of his air crew. Yet others involve communication to the aircraft and the ground-control systems. Still others include navigation. All these are in addition to the complex skills related to the flying of the aircraft, the preparation for operations such as bombing and the like. Each of these complexes of

activities can form behavior streams consisting of sequences of behaviors leading from those which are simple to more complex ones. The later, complex performance is thus dependent on the acquisition of prior skills and knowledges.

3. The development of training exercises which could be matched to each of the behaviors in each stream. Sometimes this involves the development of a general setting in which a sequence of skills can be taught--such as the pilot simulator which enabled the practice of skills ranging from communicating with ground control, starting the engines of the aircraft, through to flight conditions including combat problems. At other times the exercises are simple and discreet, including programmed tasks and simple exercises.
4. Creating the evaluation system. Related to each training exercise is an evaluation device, preferably administered immediately after or imbedded within the training task, to determine whether the behaviors were acquired and to provide immediate feedback to the trainee or the instructor, achievement of the skills. This is one of the critical steps in developing a training system and one which differentiates it most dramatically from indirect training methods.

For contrast, let us imagine a teacher in 1942 attempting to teach children how to relate to each other more democratically in making decisions. The teacher might carry on activities with the children in which they would define goals, set procedures, and carry them out. What the teacher would very, very rarely do, so rarely that it was almost a momentous event in the classroom, would be to provide immediate feedback to the students about each element involved in setting mutual objectives and procedures. Teacher and students might have a general evaluation from time to time or a discussion over how things were going.

In a training system feedback would be handled much differently. The pilot who is learning to operate an aircraft might be in a situation, say at the early stages of training, which required him to simulate a call to a control tower asking for permission to take off. If he did not do this correctly, he would get immediate feedback and correction and further training. If he did not make progress toward these or other goals, he would be dropped from the program or recycled so he could begin with another group of flight cadets and go through the whole training program from the beginning. The feedback ensures mastery of tasks which, while often very simple in themselves, would be very critical to the eventual performance of the terminal task.

The training psychologist was very much concerned to see that all the behaviors within each behavioral stream were mastered with relative certainty so that after a trainee had passed a given point in the training program, he could know at once what he had been able to do and for what he had the prerequisite skills in terms of later training.

5. The prior steps lead quite naturally to the development of a managed program in which evaluation is monitored by a system which can determine progress of all trainees, strengthen weaknesses of particular aspects of programs, and so on.

The importance of evaluation systems explains why training psychologists adopted the practice of stating behavioral objectives in measurement terms, even using sample test items as exemplars of the specific behaviors which would be required to complete a training unit or module. It does not

> help the trainer to have a behavioral objective defined precisely if the measurement is not included and one can determine whether the behavior has been achieved. In other words, the particular positivistic convention that became established was to state objectives always in precise terms that specified the conditions under which they might be measured. Whether this is necessary for all education is not clear, but in the urgency of crash-training programs, it is quite understandable and seems so obvious that questioning it has not been done frequently or with any great thoroughness although the practice has been severely criticized.(A-3)

Many of the personnel who have worked in the education industry, in educational measurement, and in curriculum since the Second World War have been involved in or were influenced by the experience of the training psychologist and have come to adopt the "measurement way" of stating objectives. See the following for example, which is taken from one of the IPI behavioral streams for Reading.

In the present concern for accountability in education, it is natural that it is to training psychology procedures that educators should turn. If the competencies of the teacher can be defined in measurement terms, then we can hold trainers of teachers accountable and certify them in terms of a measurable performance. On the other hand, if we speak of certification in terms of the accumulation of credits in education courses and hours of practice teaching experience, we have no way of telling what was learned through those experiences and no way of holding people accountable if the teacher is unable to perform satisfactorily. Thus it is that companies such as Systems Development Corporation and research and development centers such as those in Pittsburgh and Los Angeles which have experience in the application of training psychology procedures to educational planning have come to take an important place recently in the development of teacher training procedures, procedures for the teaching of reading, and in other areas where it is desired to have a high degree of control over the outcome of education.

As systems planning has become more fully developed, the practice of stating objectives in terms of measurable outcomes has become more fully developed. The Bureau of Research Teacher Education Project(c) reflects this totally for there were no exceptions among its teams to the belief that if an objective could be stated precisely, a way of measuring it could be devised.

Cybernetic Psychology

It is very difficult to tell where training psychology ends and cybernetic psychology begins, and it probably would not even be productive to make the distinction except that it underlines a particularly important development that occurred between 1940 and the present, a way of thinking about learner and a training system development so important that no understanding of competency-based education can be made without apprehending it.(Smith and Smith, N-79)

If we conceive of a person as an automatic, self-regulating, information processing system and liken it to an electronics communication system which is capable of receiving information from the environment and modifying its own behavior to become more effective in its environment, we get a picture of a computer connected to its environment by sensors. This machine processes information on its own behavior (as that behavior relates to the environment) and learns by experience.

If we take this a step further and suggest that an environment be built which facilitates the effectiveness with which these sensors can detect the performance of the individual in its environment (if, in other words, we build a machine designed to fit very closely the requirements of the human machine), we can conceive of developing training systems made up of tailored environments and training tasks which lead the student to practice new skills and improve his performance by responding to feedback to his behavior.

It is out of this kind of machine--one built to fit the requirements of the human one that we have the development of cybernetic psychology and its most common application to education, simulated systems designed for training purposes.

Let us at once proceed to examine this in terms of the training of the teacher. Student teaching and methods courses have been the common methods for training the teacher. Suppose that we want to teach Behavior "A" to a teacher. Suppose that that behavior is the capacity to employ advance organizers in teaching.(E-13) An advance organizer is a generalization which provides a conceptual anchor for material that is to be presented to students. In the ordinary circumstances of teacher training, the idea of an advance organizer and how it might be used would be presented to the teacher candidate either in a methods course or an educational psychology course. Let us suppose that this has been efficiently accomplished, that the teacher candidate knows what an advance organizer is and knows how to facilitate the mastery of material to be presented verbally to the learner.

The teacher candidate, in the course of his practice teaching, may or may not have an opportunity to practice using advance organizers for determining their effect on learners. His cooperating teacher may assign him to instructional situations where organizers are not appropriate or give him instructional methods which are not compatible with the use of organizers. It may be some time then, if ever, before a trainee has an opportunity to practice using them, but let us suppose that he does find an opportunity within a few weeks of being taught what an organizer is and how it might be employed. The chances are that no one in his environment can reflect with him on his experience. Did he actually use an organizer? Was it appropriate to the verbal material? Did it have a positive effect on the learners? These questions he has to cope with by himself with very little assistance. Now if he is an extremely assiduous learner, he may not only have mastered the idea, but he may figure out a way of conducting an experiment in which he can get this information for himself, but it is quite a task to do so, and we would not expect him to be able to do this with respect to very many ideas.

Now, let us suppose we take a cybernetic stance toward the same problem. Let us build a teaching laboratory in which our teacher candidate can be presented with an instructional system or with a seminar or lecture or series of readings designed to teach him what an advance organizer is and how it can be used. Let us provide him in the teaching laboratory with a small group of learners with whom he can immediately try out what he has learned. Let us further provide him with observers who can consult with him about the nature of his organizer and help him compare his procedures with those that others have used in similar circumstances. As he teaches, let us provide observers who can analyze his behavior and feed that back to him. In addition, let us help him construct measures to determine whether the organizer functioned for the children. In his environment, he receives a tremendous amount of feedback about his knowledge of organizers, his ability to construct them, his ability to present them to children, and the effects that they had on those children. He is then in a position to correct his own behavior, to modify what he is doing according to criteria related to the learning that he was supposed to be acquiring.

Although we have yet to see the application of simulation within a systematic teacher training program which provides an optimal series of teaching laboratories in which full effects of simulated training can be felt, there are some simulations in present use. Teaching simulations such as Cruickshank's,(C-8) Joyce's(C-8) and Kersh's(C-8) and, to some extent, micro-teaching(D-3) are designed to control the training situation so that there can be a focus on specific kinds of behaviors to be acquired by the teacher candidate, but in an environment which simulates reality. That is, his behaving is under conditions analogous to those under which he will eventually teach.

People wonder at once whether a complex activity such as teaching is amenable to cybernetic psychology, which tends to simplify reality in order to make it easier for the learner's information processing system to operate effectively when he tries to acquire specific behaviors. Thus far there is no empirical evidence on this question, but the existence of very complex simulators to train functionaries such as submarine captains and battalion tank commanders indicates that the applicability is there.(C-23) The submarine trainer, for example, puts the captain and his crew into conditions in which they communicate with the world only through sonar, radio or their periscope. The simulation is so elaborate that they can navigate their submarine, be attacked by the surface vessels, engage in evasive action, see feedback in terms of whether that evasive action was likely successful or not, and can repeat the encounter in order to modify their behavior and learn behavior which would be judged to be effective in the situation.(A-4)

If critical, complex warlike situations can be simulated effectively in the development of cybernetic trainers, it seems reasonable to suppose that the relatively more tame environment of the classroom can be simulated with a realism to be effective for training purposes.

The Empirical History of Competency-Based Training in Teacher Education

The history of experiments in competency-based training in teacher education is scattered and somewhat difficult to pull together. Evidence of effectiveness is so far quite sparse.

Nearly all of the accumulated evidence has come from the specific experiments to test the effectiveness of products or specific procedures for changing teacher behavior in minor ways. We shall treat this literature in terms of the general question. Can direct training methods influence the behavior of the teacher and what kind of training procedures appear to be most effective?

The "Micro-Teaching" Complex

A series of instructional systems have been developed using explanation, televised demonstration and television playback to provide practice and feedback to the teacher about his behavior. A surprising proportion of this work has related to the "micro-teaching" experiments, developed by Allen and his colleagues at Stanford University.(p.3) The work reported by Allen, Fortune, Acheson, Schmuck, Olivero, Ryan and others either through television or through written descriptions and then practiced the behavior with small groups of children, teaching and reteaching until the behavior was mastered. It seems clear that such instructional procedures can indeed result in changed teacher capacity to perform at least in the "micro-teaching" situation, and there are several studies indicating long-term effects in relation to pupil response to the teacher. Acheson's study indicated that there is evidence that the television model alone unaccompanied by a written model does not provide the teacher with the theoretical understanding necessary to carry out the behaviors but that the written model alone is definitely insufficient.

The Far West Laboratory has developed a series of instructional systems employing micro-teaching called "mini-courses" and these have been submitted to extensive field tests. These have been created to teach a variety of teaching skills including some fairly complex ones. Borg and his associates have been careful in their research, and there appears very little question about their ability to use straightforward developmental procedures to create mini-courses and similar instructional systems which have the capacity to teach teachers a considerable variety of teaching skills. (D-17)

The Interaction Analysis Complex

Flanders, Amidon, and their associates have produced a considerable number of studies in which they have attempted to change teacher behavior by teaching teachers systems for studying their teaching. Particularly they have used the system called Interaction Analysis which is a device for coding teacher and student communications in terms of several categories which dimensionalize teaching as direct or indirect. In most of their studies teachers have been taught how to study their teaching using the Interaction Analysis System, and then they have studied their teaching and attempted to modify their behavior depending on what they have discovered. (D-5, 35)

While the evidence is somewhat mixed, it does appear that teachers have changed their behavior somewhat as a result of Interaction Analysis feedback and that student teachers who learn to study their teaching using an Interaction Analysis system develop less direct patterns of behavior than do student teachers who are not exposed to it. The following chart summarizes their research.

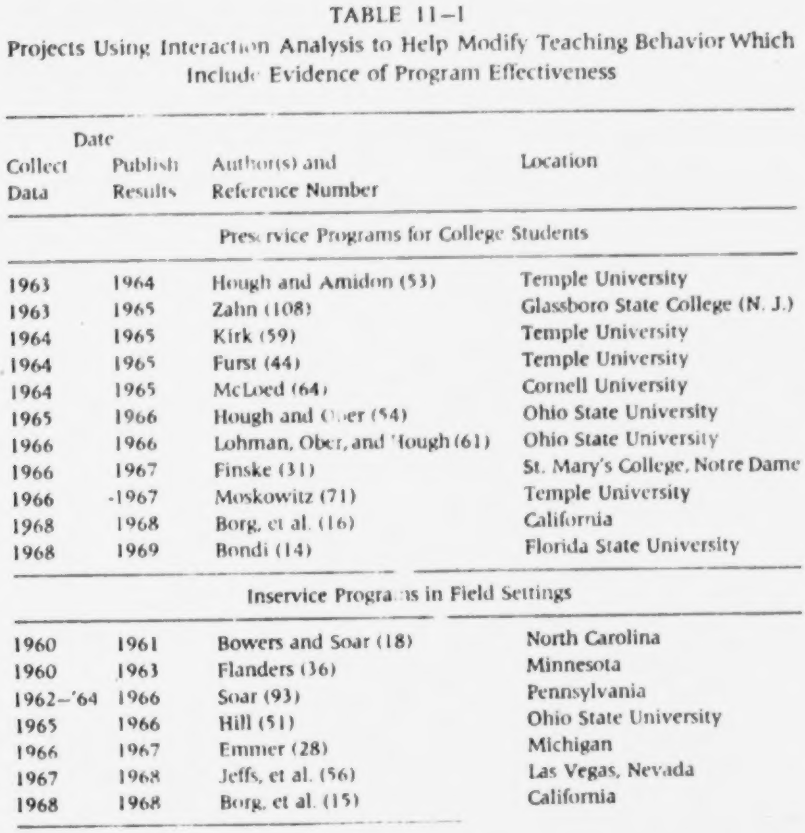

TABLE 11–1

Projects Using Interaction Analysis to Help Modify Teaching Behavior Which Include Evidence of Program Effectiveness

Date Collect Data	 Publish Results	Author(s) and Reference Number	Location
		Preservice Programs for College Students	
1963	1964	Hough and Amidon (53)	Temple University
1963	1965	Zahn (108)	Glassboro State College (N. J.)
1964	1965	Kirk (59)	Temple University
1964	1965	Furst (44)	Temple University
1964	1965	McLoed (64)	Cornell University
1965	1966	Hough and Ober (54)	Ohio State University
1966	1966	Lohman, Ober, and Hough (61)	Ohio State University
1966	1967	Finske (31)	St. Mary's College, Notre Dame
1966	-1967	Moskowitz (71)	Temple University
1968	1968	Borg, et al. (16)	California
1968	1969	Bondi (14)	Florida State University
		Inservice Programs in Field Settings	
1960	1961	Bowers and Soar (18)	North Carolina
1960	1963	Flanders (36)	Minnesota
1962–'64	1966	Soar (93)	Pennsylvania
1965	1966	Hill (51)	Ohio State University
1966	1967	Emmer (28)	Michigan
1967	1968	Jeffs, et al. (56)	Las Vegas, Nevada
1968	1968	Borg, et al. (15)	California

(Taken from p. 351 of D-35)

Teachers apparently have become somewhat more flexible in their behavior as a result of Interaction Analysis and their patterns of teaching appear to become somewhat more responsive to pupil ideas.

One of the mini-courses developed by Borg and his associates was designed to teach the Flanders system of Interaction Analysis to teachers. The results were more positive than in any other of the Interaction Analysis feedback studies.(D-18) The teachers changed on eleven of thirteen measures with particularly strong changes in the proportion of teacher talk in relation to pupil talk.

The research is partial and has not always been cumulative, but Flanders, Amidon, Hough and their associates have provided evidence that permits us to conclude that when teachers are taught how to study teaching using Interaction Analysis systems that modifications in their behavior can be made in predicted directions. The state of the research indicates that Interaction Analysis instructional systems can by no means be concluded to be a powerful teacher training technique in terms of their present state of implementation, but there seems strong support for the notion that it is a potentially very powerful technique if applied in the context of a systematic training program.

Research on Planning Behavior of Teachers

Ever since Turner and Fattu had considerable difficulty distinguishing teachers and nonteachers in terms of their ability to frame instructional objectives based on a diagnosis of pupil products and since Popham and his associates obtained the discouraging findings which led off this section,(C-26) a number of studies have been conducted to test instructional systems designed to teach teachers to frame behavioral objectives and to relate instructional procedures to them. Popham's instructional systems do seem capable of teaching teachers to establish behavioral objectives and select instructional procedures related to them. He also reported that pupils apparently learn more when teachers frame objectives although such research is difficult to conduct because if teachers don't select instructional objectives and procedures, it's hard to tell exactly what learning outcomes one should measure.

Research Employing Instructional Simulation

Cruickshank and Kersh conducted research using simulation to train teachers and have reported positive results.(C-8) Neither simulation is an elaborate one, but the findings are nonetheless positive and provide encouragement to those who would want to develop more elaborate simulations for the training of teachers.

Other Research Related to the Training of the Teacher

In the last few years, especially stimulated by the establishment of a number of regional laboratories with intensive teacher training programs within them, there has been an increasing quantity of specific studies directed at the testing of particular instructional procedures aimed to teach specific teaching skills or sets of behavior. For example, at the University of Texas Research and Development Center, a variety of studies have been done. Some of these have been similar to the Interaction Analysis studies mentioned earlier with teachers being taught category systems and helped to modulate their behavior while receiving feedback derived from their own studies of their own teaching. On the whole the results of this work have been positive with teachers making significant changes particularly in learning to ask particular kinds of questions and to control their questioning behavior effectively.(D)

Also in Texas a series of instructional systems has been developed to teach teachers of elementary school science a teaching strategy derived from the scientific process. This system also appears to be effective in inducing teachers to adopt the pattern of behavior that forms the center of the instructional system.(See: Appendix)

In a similar line of work, the Regional Laboratory of Kansas City has developed and tested an instructional system designed to teach teachers a model of biology teaching, also with promising results from the field studies.(Appendix) Parsons conducted rather sketchy field tests of a system designed to move teachers in a number of directions through a complex Interaction Analysis system and also reports positive work although there has been no replication from independent sources and the data are sparse.(Appendix)

Bereiter and Engelman have designed a teacher training system to teach teachers the model of early childhood education which they espouse, and they also report consistently positive results in the training of the teachers to produce that model.(E-11) Research for Better Schools, the Regional Laboratory of Philadelphia, has designed a training system to teach teachers to carry out the behaviors necessary to implement the Individually Prescribed Instruction model and report considerable effectiveness from what is a fairly short and easy-to-administer instructional system.(A-75)

It is worth noting that most of this research is product-related and really constitutes product testing rather than basic research. Up to this point, it seems clear that direct instructional methods can change teacher behavior, that teaching skills can be taught, and that relatively direct, easy-to-administer instructional systems can be used for that purpose. Work done both at the University of Florida and at the University of Massachusetts as part of the feasibility studies of the Bureau of Research Teacher Education Project has indicated that such instructional systems can be monitored by management systems, but this is hardly surprising.(6) Some studies have related the changes of behavior by teachers to responses by pupils, but this work is thus far fairly sparse and incomplete. Probably, up to this point, the magnitude of changes in teacher behavior are not ones which would be likely to bring about changes in pupil response to the environment. That is particularly true with respect to training in specific behaviors or skills which may be employed after that point by the teachers on a relatively infrequent basis.

For example, if we teach the teachers a skill such as modulating their questions to induce various levels of cognitive activity on the part of the children, the teacher may or may not employ that skill frequently even though we may know that we have trained him to do it, and that he has the capacity to do it at will. On the other hand, much is known about the effectiveness of IPI and the Bright or

Engelman system for the teaching of children, and it is now known that we can teach teachers to implement those models of instruction. In other words, to know that we can train teachers to manifest certain skills is useful. To know that we can do so in such a way that we can implement a particular instructional model over a long period of time is a finding of considerably more magnitude.

Teaching Teachers Models of Teaching

At Teachers College, Columbia University, a series of studies have been conducted in the last few years built on the work developed out of the Bureau of Research's Teacher Education Project.(6-8) These studies are designed to learn the extent to which teachers can be taught to manifest a considerable variety of teaching strategies. The purpose of this research is twofold. One is to learn whether teachers can be taught complex models of teaching that they implement on their own and second, the extent to which teachers can master a variety of models of teaching or are limited to only one or two types of teaching strategies. In research completed during the past year, teacher candidates were exposed to a series of instructional systems designed to teach teaching strategies requiring very different sets of teaching skills.

One of these teaching strategies can be characterized as "personal" and is designed to induce students to creative thinking behavior. The second can be characterized as Group Investigation. In it teacher and students together develop cooperative inquiry into problems of significance. The third model of teaching is an inductive model and involves data collection and analysis. The fourth model is a behavior modification model derived directly from the work of B. F. Skinner. (F)

These four models of teaching were taught to a group of twenty-eight trainees during the fall of 1970. The behavior of the trainees when experimenting with the models was compared to their normal styles of teaching and to the normal styles of teaching of their cooperating teacher. When we compare the normal teaching styles of the student teachers to the normal teaching styles of the cooperating teachers, they are very similar with respect to amount of questioning, amount of questioning requiring higher order of response by children, amount of attention devoted to procedures, the amount of attention devoted to including students in the determination of procedures. Their patterns of reward and punishment were very similar as well.

In experimenting with the several models of teaching, however, the patterns of teaching manifested by the teacher candidates were very different from both their normal styles and the normal styles of their cooperating teachers and were different in the ways predicted according to the specifications of each model of teaching. In the Inductive Model, for example, they collected data with students, helped the students to gather data, analyze data, and theorize about the results of the analysis. These last two types of behavior, helping students analyze data and theorize about the results of the analysis, were extremely rare types of behavior in the normal teaching styles of the teacher candidates or their cooperating teachers.

Similarly, the Behavior Modification strategy produced different teaching patterns from those the teachers normally manifested. The same was true of the Group Investigation Model in which the determination of goals and means by teachers and students working together was in stark contrast to the normal behavior of teachers with respect to the development of procedures in the classroom.

Perhaps most dramatic, however, was the shift in style brought about by instruction in the Creative Thinking Model. This model requires teacher questions and pupil responses at the synthesis level--(one of the highest levels of the Bloom taxonomy). When experimenting with the Creative

Thinking Model, teachers' and students' verbal communications at the synthesis level comprised over fifteen per cent of their total verbal communications during those episodes, compared with less than one-tenth of one per cent in "normal" teaching styles.

It had been expected that the attitudes of the teacher candidates toward teaching and learning would effect their learning of the various models. That is, it was expected that those students who were oriented toward child-centered education would prefer the Creative Thinking Models and the Group Investigation Models as compared with the Behavior Modification Models and the inductive ones. This did not turn out to be the case. The teacher candidates learned the models irrespective of value orientation.

This does not mean that in the long run the teacher might not prefer one model to another or that over the long run he might not be more effective in one model than another. (There was great variation in the ability of teachers to learn any one model of teaching.) What it means is that direct instruction using individualized instructional systems were effective in teaching teachers who differ greatly in values and other characteristics to radiate a wide variety of instructional styles.

The instructional systems each consisted of six "modules" or sections: (a) a theory section in which students learned about the theory of the particular teaching strategy and were acquainted with research on its effectiveness and the types of instructional goals for which it was appropriate, (b) a demonstration section in which a variety of media were employed to demonstrate the model, (c) a "peer practice" section in which the teachers practiced by teaching each other, (d) a "guided practice" section in which teachers practiced with children employing specially-prepared materials, (e) an "application" section in which teachers practiced in relation to content and materials they selected themselves, (f) a "decision-making" section in which the uses and appropriateness of the model is studied.

These steps are apparently sufficient to prepare a teacher to carry out a model of teaching for relatively short periods (a few class sessions at a time).

If one wished the teacher to display a particular model of teaching over a long period of time and to become effective with its use with children to the point where it would have a noticeable impact on their achievement and affective growth, then it would be necessary to provide for that teacher an opportunity to work in an environment which was conducive with the use of that model of teaching. This is dealt with in another section of this paper when we discuss at considerable length the relationship between the model of the school and the model of the teacher which is the goal of the training program. It is a critical issue. At this point, we can say with some confidence that direct training procedures can be used to bring teachers to specific levels of performance even in relation to complex models of teaching. However, up to this point, there has been no convergence of the three factors which are probably necessary in order to evaluate performance-based education. One is the development of a setting in which the desired performances can be manifested. The second is the development of effective instructional systems to bring about those performances, and the third is the convergence of these in a situation in which teachers can get feedback about and engage in study into the consequences of their behaving in specific ways.

Despite this, the Joyce, Wald, Weil, Gullion studies of 1970-71 indicate, particularly if they are interpreted in terms of the other research which has been cited here, that we have within our capability the production of complex instructional systems to train teachers to high levels of performance and quite a variety of models of teaching. When we bring this capacity together with the development of complex systems of teacher education that are, in turn, related to the educational settings in which the teacher is enabled to behave with what is consistent with the models he is being taught, it seems a reasonable hypothesis that there will be change of teacher behavior of a magnitude not seen here hitherto--one which will be likely to have an effect on pupil behavior to an extent not yet seen in any single educational experiment to date.

Curriculum Construction Experience

Outside of the field of teacher education there is now a wide variety of experience in the creation of performance-based curriculums for children and for adults in areas which are not directly connected with the training of teachers. There is so much diverse but fragmentary experience that it can only be sampled here in a most frugal manner. It behooves us to make the bias of the selection as clear as possible.

A selection has been made to try to indicate the nature of the curricular systems which have been developed and the types of results which have been obtained through the use of different types of systems. Thus what is reported here is of curricular systems using different instructional techniques and research into the effectiveness of those various techniques.

In the second case, an attempt has been made to try to identify the models of teaching that have been proposed by the inventors of performance-based instructional systems for children.

In the third case, an attempt has been made to try to identify the types of domains to which performance-based education has been applied. This provides some idea of the potential for application within the teacher training field.

Training Systems

The training psychology movement described above has resulted in an enormous number of applications to a vast variety of military and industrial needs. The procedures used by the training psychologists have almost always resulted in instructional systems which are straightforward in nature. That is, they consist of sets of behavioral objectives and training tasks which are presented to the learner to induce him to practice the behavior to be learned. Successive tasks move him up a ladder of skills and in successive field tests, an attempt is made to improve the staging of the training tasks so that there are reasonable increments of skill. That is, most of the trainees can accomplish the jump from one task to the next, but the step is large enough to minimize boredom. It is peculiar that in the literature on training systems so little attention has been paid to the development of guidelines for determining optimality of steps. That is, nearly everyone agrees that the steps should be small enough to be feasible for the average trainee but not so small as to induce boredom. At this juncture, the yield from the vast literature does not consist of principles that can be followed by the present generation of people who are building training systems. (A) (A-78) (A-61-65)

Be that as it may, the systems consist of steps of tasks which lead the student toward the complete performance which has been specified in terms of the behavioral elements that have been sequenced, and, as indicated before, each task is accompanied by an evaluation device which can be used to ensure that the student has accomplished the learning which was specified for the task.

A variety of strategies have been employed in the development of the training systems. For skills, especially psycho-motor skills, there has tended to develop a demonstration, practice, feedback, redemonstrate, repractice, feedback cycle which is repeated at various stages of complexity. For example, in training a person to shoot a machine gun, the trainee might see a demonstration film, then see a demonstration with an actual weapon, then practice, receive feedback on how well he is doing both in terms of form and accuracy, see further demonstrations, and so on until he has become proficient. This cycle is very common. It is logical and straightforward, needs not be guided by any theory, and it is effective for a great many tasks which are simple or only moderately complex. For more complex tasks, the strategy finds elements of the behavior being taught and then gradually builds up into the more complex ones. (A-35)

Programming was developed to implement operant-conditioning techniques into training systems. A program consists of a set of objectives and then a set of exercises designed to induce the desired behavior and begin feedback which either the learner gives to himself or is given to him. Variations on programming include several varieties of branching so the persons can skip ahead if they have already mastered some of the skills which are to be taught or can be recycled into further training if they are not progressing at an optimal rate. (A-78)

Simulation is often employed to provide for a training ground in which the learner can practice his responses to certain tasks and then find out in a "real world" way his responses so that he can modify his behavior to approximate the correct one. In an automobile driving simulator, for example, one sits in the seat of a realistic automobile. It has a steering wheel, a shift lever, a brake, a clutch if it's a manual transmission automobile. Various tasks are given to him. Tasks in such a situation are often presented by film. In the driving simulators, for example, the film shows a road down which the automobile proceeds, and various obstacles appear and have to be avoided by the trainee's manipulation of the wheel. If he does not avoid an obstacle, if he turns too sharply, then the consequences of his act are fed back to him so that he can modify himself. Again the tasks are usually sequenced to lead the student from the simple toward the complex. For example, he would be given practice in avoiding people who are stepping from curbs, then practice in stopping for a traffic light, then practice in doing both at the same time. (A-12)

At present, game-type simulations have been developed in a vast variety of educational areas. There are economics games which are played by computer to teach students the principles by which the economics of nations operations, by game-type simulations to teach students about economic geography, the effects of social status on human behavior, how the economy of a city works, the principles by which people behave politically, and so on.

There is considerable evidence that it is possible to build a game-type simulation that will result in a definite achievement of specified competency. This should not, of course, be taken to mean that all the game-type simulations that one finds on the market today are effective; there are a great many presently available which, in my judgment, are very poor bets for effectiveness, but sufficient is known at this point about the construction of such games that it is possible to engineer them. (A-12)

In the late '50's and the early '60's, came the development of the language laboratory and the vast quantities of programmed instructional materials for the public schools. The experience of these developments seems to indicate very clearly that is possible to build direct instructional systems which are self-administering and which are constructed so as to provide regular feedback along a sequence of competencies to children in such a way that the terminal behaviors are gradually achieved. (A-74)

The real potentials of systematic laboratories and programmed materials have been obscured somewhat by public reaction to the fearful vision of the possibility of a school environment in which children sit day after day before banks of consoles presenting them with simple tasks and immediate feedback. This is unfortunate because it has caused competency-based training of children to be discussed in the dichotomous ways that methods have been discussed in the past. That is, there has been a tendency to reject any method that does not seem to be appropriate as a single learning mode in every subject all day. The fact is that children need exposure to a variety of learning modes so that their environment is rich and offers appropriate training for different kinds of learning objectives.

As indicated several times before, IPI is the single most dramatic application of training psychology to a major curriculum area in the public school. It has been applied to reading and arithmetic, and plans exist for extending it to social studies. The curious thing about IPI is it has proved so easy to disseminate in the sense that once schools are committed to it, the teams from Research for Better Schools can, within a relatively short period of time, train the teachers and aides to perform the IPI duties and can have the system operating smoothly within a few weeks of when school opens. This brings about a radical individualization of instruction of a type which has not before been accomplished in anything like so short a time or with such a relatively modest increase in personnel. The reason that this is curious is that IPI has been disseminated in the face of constant criticism by educators who dislike what they see as its impersonality. It seems that, failing to provide individualization through the classroom teacher, they are bound and determined to resist efforts to individualize through technology. Be that as it may, the dissemination of IPI has moved along at a considerable pace, and it presently exists in over a hundred schools largely on the East coast of the United States. (R-46, 47, 48).

Chapter Four

Innovation and Performance-Based Teacher Education

Performance-based education will only be useful if it increases the capacity to change the school. In this paper this problem is dealt with in terms of two perspectives; what has experience with innovation told us, and what should be the model of the teacher.

In the following section is a terribly brief overview of reform movements in education. The theme which is developed throughout the material is "what yield of knowledge have we from the last twenty years which suggests how teacher education should be meshed with other reform strategies."

What Has Been Learned Since 1950?

Abstract

Reform movements prior to 1950 were directed toward dissemination of one type of teaching method (child-centered, democratic-process teaching) which was assumed to be good for all purposes and was to be used by all teachers. The teacher was assumed to be the critical person in the educational process.

Since 1950 several efforts have changed our insights and our available technology.

1. Architecture and Organization. A movement to reform school architecture and organization of personnel has left us with the awareness that changing one aspect of a school rarely has effect, but several aspects, changed together, can have potent results, and that the education profession resists changes and often absorbs their impact without changing educational output.
2. Academic Reform. The Academic Reform movement has developed new approaches to teaching content, created strong materials for children, and has had little general impact on the lives of children except in those places where materials, teacher-training, and strong administrative leadership

have been present. Again, the message is that a reform effort with several convergent dimensions can be effective.

3. Technology. The Technological movement has produced a variety of technological forms which are effective for educational purposes but which cannot be implemented in the schools unless accompanied by changes in staff utilization patterns, staff-training, physical plant, and curriculum. Simply making technologies available to the teacher has not had much effect on education.
4. Teaching Strategies. A large number of teaching strategies have been developed and tested with positive results but implementation is elusive. To implement them requires the confluence of events indicated in 1-3, above.

The message is clear: (1) We have a much larger armory of strategies than ever before. (2) The school as presently organized and staffed is highly resistant to all forms of innovation. (3) A confluence of changes has to be initiated including staffing patterns, teacher training, on-site leadership, curriculum, and materials of instruction if changes are to be brought about and maintained.

1950-1970: What Have We Learned about Education?

Have the last twenty years resulted in enough increased knowledge about education that we are in a significantly better position to design and implement better educational forms?

This is a tough question and the answer is not wholly clear. We will approach it in three stages:

By very briefly describing the approaches taken by reformers prior to 1950.

By describing increases in knowledge and skills between 1950 and 1970.

By trying to identify the implications of these increases for strategies of design and reform.

Before 1950: Two Strategies

Up until 1950 there were essentially two reform strategies in education, each of which had been vigorously pursued during the twentieth century. One of these was a movement to expand educational offerings. The other tried to change the general ends and means of schools. (E-27) The movement to expand the possibilities of education for more citizens does not concern us here. The increase of vocational schools, special academic high schools, consolidated schools, and the expansion of programs in the secondary schools were all attempts to make it possible for more children to receive more types of education than they were receiving before. The expansion of colleges is the recent extension of this strategy.

The expansion of education concerns us less in the present context than does the other kind of reform because it involved not so much knowing how to educate as deciding whom one wanted to educate and what he wanted to teach him. Often the reformers who found ways of expanding the educational system and its possibilities had little or no control over the quality of what was done. There are few people, in fact, who would argue at all that the increase in the number of students attending secondary schools during the first half of the century was in any way connected with an improvement in quality during the same period. If we ignore quality, however, the increase in offerings was impressive.

The other kind of reform was based on definite beliefs about what would improve the quality of education, as contrasted with expanding its clientele and offerings. The essence of the thrust in the first half of the century was toward moving education toward a more child-centered stance and toward the active preparation for democratic citizenship. The proponents of both the child-centered and democratic stances believed that the best education enabled the student to determine his own learning goals and the means he would use to achieve them. They favored indirect teaching methods, equality between teacher and child, and courses of study which emerged as teacher and student interacted rather than being set pieces. At the level of verbal discussion of education, the child-centered, democratically-oriented movement was triumphant.

In many teacher-training institutions, democratic process methods and child-centered methods were taught on the verbal level. Textbooks, curriculum guides, and national meetings were influenced by them. However, because the primary method of teacher training was apprenticeship to teachers in the existing schools and during the apprentice period most of the effects of the verbal training were neutralized. By the end of training very few of the new teachers were noticeably more child centered or democratic in their orientation toward children than were their predecessors.(E-27)

The thrust of the reform was plain to see in its literature. Curriculum texts such as John Michaelis' methods books(F-8,9) emphasized democratic-process teaching.

They extolled democracy and its perfection as the central purpose of the schools. The philosophy of the influential Bank Street School toward early childhood education and organizations such as the Association for Childhood Education International were unswervingly child centered and the philosophy was reflected clearly in their publications.

Despite a massive effort, reformers from 1900 to 1950 apparently were unable to achieve lasting reforms in actual school settings unless some of their strongest devotees remained there. Summerhill began on child-centered premises and remained such because Neill remained there.(E-39) The Bank Street School has remained child centered because it has successfully passed down its mantle of leadership to sympathetic heirs. Many of the other child-centered schools, despite massive evidence (especially that from the eight-year study(B-27) that child-centered and democratic methods were advantageous to the child's education, changed their character, or even disappeared after their strongest supporters departed for other places. The persistence of reform from the child-centered, democratic stances had been very low indeed.(F-15)

The child-centered and democratically-oriented reform thrust depended on changing the behavior of teacher toward the models of teaching favored by the reformers. The movement depended almost entirely on inservice education. School organization and technology were not created or manipulated by these reformers--in fact, the leading advocates often opposed organizational reform and technological devices--who wanted the classroom teacher to change and who believed he could and would change. There is massive evidence, of course, that he did not move as they had hoped.(5)

1950-1970: New Ideas

From 1950 to 1970 there have been three or four thrusts in research and in reform of education that have changed our knowledge from what it was in 1950.

Architecture-Organization (E-35)

One of these is the school architecture movement and the school organization movement which accompanied it very closely. The primary focus of the architecture movement has been to move the concept of the single, all-powerful teacher performing all roles in the life of the child and toward a concept of education in which many adults, h

occupying many roles, would support the life of the child as he would endeavor to educate himself in a variety of ways.(E-5)In other words, the thrust was moving from a relatively homogeneous conception of teaching as something that could be done for a group of people by one person (supported by specialists in areas where he was clearly unable to perform) toward a conception of an education of many kinds created by a number of people in the life of the child.(E-4-7)Thus conceptions of team teaching and differentiated staffing accompanied the introduction of schools which were not built like "egg crates" but which rather had the kind of smooth-flowing, flexible spaces that could be adapted to a wide variety of modes of education and a wide number of people working together.~~(8)~~(E-6) Thus the organizational reform movement and the architectural reform movement grew simultaneously and, largely, together.

A number of things have been learned from the experience of those intertwined efforts. In the first place, this reform movement was massively resisted by the teaching profession. In the school district in which the famous Valley Winds School was opened in the fall of 1964, It was also learned, despite or perhaps even because of a dearth of formal research, that one cannot simply put a group of teachers into a new setting and expect education to change in the least. Differentiated staffing provided extra hands but did not seem to provide qualitative changes. Wide group instruction turned almost invariably to lectures, often with audio-visual aids, and the free-floating modes of self-instruction that had been envisioned by the promulgators of the movement.

The experience of the reform movement in architecture and school organization has indicated very clearly that it is not enough simply to organize teachers into teams, provide them with aides and expect any radically different type of teaching to take place.

There is, however, one kind of general observation that can be made that points the way to the future. That is, in some of these schools where: (1) organizational changes have been made and (2) new physical plants have been developed that provide for an easy implementation of a different kind of education and (3) *at the same time, a massive inservice effort has been carried on under strong leadership*, the school is very different from the average one. A good example of this is the Kennedy High School a twin school, also of a snail design, was opened on a traditional model that was proudly proclaimed by its principal and teachers to be superior to the madness that was going to go on in the Valley Winds School. (B-70) Thus the beautiful school building, with its free-flowing, flexible classes was divided by means of movable furniture into egg crates within the smooth snail surfaces. Many educators who had previously been regarded as progressives became suddenly concerned about what would be the effect on the child of the presence of more than one adult in his educational life, especially the young child. The model of the self-contained classroom teacher was defended by the old reformers as the new reformers sought to bring alternative staffing patterns into the school. The corresponding movement toward nongradedness shepherded into existence especially through the writings and speeches of Robert Anderson and John Goodlad (E-49) was perverted into a series of steps through which all children would go, often at the same rate, resulting in many cases in "fifty grades" whereas before there were six in the elementary school. It became an excuse for homogeneous practices, highly-sequenced instruction, and an even more regimented school was able to result from the banner of the open concept.

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in Montgomery County, Maryland, where a varied group of innovative people were fortunate enough to inherit a facility which provided not only a good deal of open space but space where a variety of support systems could be developed, such as library systems, audio-visual systems which students could use themselves, and so on. The keynote of the Kennedy High School is student participation in the government of their own affairs, especially their academic affairs; and the leadership has succeeded in bringing about a school climate which is noticeably different from that of the strong academic schools of equivalent demographic population in the nearby Montgomery County area. This is not to say that the Kennedy School is necessarily superior to the others, but it is certainly very different from them.

The Kennedy-type experience is far more promising than simply employing team teaching or adding aides to the school. Worse, some districts have developed an open-plant school and then introduced the school administration and faculty to it without a special training program. Nearly everyone concerned has been disappointed and frustrated. Those places which have combined an artful planning of the facility to include support system areas, strong leadership, and intensive inservice training have in some cases made a noticeably different atmosphere.

The Academic Reform Movement

Since 1950 also, we have seen the rise and, to some extent, the decline of the school reform movement built around the teaching of the modes of inquiry and the structures of the academic disciplines.(15-16) Projects have developed curriculum outlines, materials for children and training systems for teachers built around the structures of the sciences, mathematics, and the social sciences and, to a much lesser extent, English and the foreign languages. Many of these reform projects were relatively well supported and had the advantage of prestige from their sponsoring organizations representing segments of the academic community. Many were also able to conduct lengthy workshops to train teachers how to use their specific materials. They were able to follow up these workshops in the schools to provide support to teachers who were trying out the approaches they had developed.

The academic reform movement resulted in the development of some very interesting approaches to the teaching of subject matter. Many of the courses and many of the teaching strategies were very interesting. A substantial body of approaches to teaching has been developed as part of the academic reform movement.(F) The results of the entire movement, however, are less than remarkable. Despite all the publicity, the enormous quantities of inservice courses and the painstaking production of great quantities of instructional materials (which although they range considerably in quality contain among them some really outstanding examples) there has been really very modest changes in both the content and the strategies used by teachers in the schools.

As in the case of the school organization movement, however, the academic reform movement has had a very substantial impact in those places in which a strong, follow-through inservice effort has accompanied the introduction of the approaches. It seems quite plain that one does not simply develop a new curriculum structure which was adopted at the policy level, back it up with materials for instruction to children, put it in the schools and get very much of a change unless this is accompanied by changes in school organization and inservice training. It does appear that there is quite a difference, however, while there is a concatenation of events. The changes are seriously eroded by the passage of time, however, unless there is a sustained follow-through over the years.

The Development of New Teaching Strategies

Again, largely since the 1950's, a large number of psychologists and educators have developed an interesting range of teaching strategies. Many of these resulted in positive findings from research. Table One indicates just a few of the range of possibilities that have been developed.

TABLE ONE

A LIST OF EDUCATIONAL APPROACHES, GROUPED BY ORIENTATION AND DOMAIN OF MISSION (See B.b.F)

APPROACH	MAJOR THEORIST	ORIENTATION (Person, Social Interaction, Information-Processing, or Behavior-Modification)	MISSIONS FOR WHICH APPLICABLE
1)Non-Directive	Carl Rogers	Person	Development into "Fully-Functioning" Individual (However, broad applicability is suggested, for Personal development includes all aspects of growth.)
2)Awareness Training	Shutz, Perls	Person	Increasing Personal capacity. Much emphasis on interpersonal development.
3)Group Investigation	Dewey, Thelen	Social-Interests	Social Relations are permanent, but personal development and academic rigor are included.
4)Reflective Thinking and Social Inquiry	Hallfish and Smith, Massialas and Cox	Social Interaction	Improvement of democratic process is central, with more effective thinking the primary route.

TABLE ONE (CONT.)

5)Inductive Reasoning	Tabs, Suchmann and others	Information-Processing	Primarily designed to teach academic reasoning, but used for social and personal goals as well.
6)Logical Reasoning	Extrapolations from Project (See Sigel, Sullivan)	Information-Processing	Programs are designed to increase thinking, but also are applied to moral development and other areas (See Koblberg)
7)Psychoanylistic	See L. Tyler and others	Person	Personal emotional development is primary and would take precedence.
8)Creative Reasoning	Torrance, Gordon	Person	Personal development of creativity in problem-solving is priority, but creative problem solving in social and academic domains is also emphasized.
9)Academic Modes	Much of the Curriculum Reform Movement (See especially Schwab and Bruner for rationals)	Information-Processing	Designed to teach the research system of the disciplines, but also expected to have effect in other domains (i.e., sociological methods may be taught in order to increase social understanding and problem-solving.

TABLE ONE (CONT.)

10)Programmed Instruction	Skinner	Behavior Modification & Theory	General applicability; a domain - free approach.
11)Conceptual Systems Matching Model	D. E. Hunt	Person	An approach designed to increase personal complexity and flexibility.

The range of teaching strategies which is presently available is really formidable. The difficulty in implementing them in schools, once again, has been one of implementation except where a massive inservice effort and organizational effort have been brought to bear around a given teaching strategy. Few of the innovative strategies have come into existence in the real world of very many classrooms without a powerful effort. Where this has taken place, however, we have been able to see rather substantial changes in instruction.(E-12) None of these has taken place on a wide enough scale to show up in achievement scores or attitudinal changes in a large area but within the small areas in which they have been implemented, many of the research results have been quite positive.

The development of teaching strategies has, of course, been clouded by the tendency to try to find a teaching strategy which will serve the same function as the universal solvent was expected to serve during the days of the alchemists. In other words, many people have tried to find a teaching strategy that would solve everybody's problems for all time. The actuality is that various teaching strategies have been found which serve certain kinds of useful purposes and which may not serve very many other purposes than the narrow ones for which they were constructed. For example, inductive teaching strategies have often been presented as if they would result in the general improvement of the student's self-concept, his academic achievement, and his relationships to his peers. What has been fairly well demonstrated is that inductive teaching strategies can very well teach the process of induction to rather large proportions of students, but they are quite clumsy as means for teaching all areas of the curriculum to all students. Similarly, person-centered teaching strategies apparently can be effective in improving the self-concept of students, but do not necessarily improve overall achievement.(E-24)

Operant conditioning is an extremely efficient teaching strategy for specific ends,(E-147) but there is very little research on its effect on the self-concept or on creativity. By the same token, strategies to improve creative thinking have often proved effective for doing just that,(E-117) but by their very nature they do not very often help the student approach specific learning tasks where he is to master skills or learn specific concepts.(F-1.1)

The efforts to develop effective teaching strategies have resulted in a really rich variety of available models for teaching and curriculum-making, but they tend to be useful for specific rather than for general purposes.

Educational Technology

Also since 1950, a variety of educational technologies have grown up and been applied to education. Television, simulation, programmed instruction, instructional systems using tape, such as language laboratories, and quite a variety of other technologies have been developed. In short-term, specific experiments, many of these have been developed and shown to be effective for achieving specific learning goals. However, many of them have foundered seriously when they have been implemented in schools. Partly this has been due to the conditions of implementation. Guba's excellent study of Impati (in which an aircraft flying over the midwest broadcast educational television programs to a variety of schools) illustrates the point. (E-56) Guba studied the usage of the televised programs within the schools and found that, on the whole, teachers did not use them effectively and that children were massively uninfluenced by the programs. Neither group was well prepared to receive the products.

Technological changes have had much the same history as the other types of innovation. When implementation was accompanied by a thorough-going inservice program where appropriate support materials were provided and where the administration was solidly behind the effort, the technologies have generally proved to be feasible and some very promising changes have taken place.(E-6)

The Message from the Medium

Thus, it appears that while there has been no dramatic discovery of a single approach to teaching which will solve a large proportion of our educational problems, the last twenty years has resulted in the development of a lot of very sound procedures and technologies and organizational changes any one of which taken alone can have a considerable impact on the life of the child provided that it is implemented properly. The real message is, however, that the public school as it is usually organized is not a fertile place in which to plant any kind of educational innovation. The custodial teacher role in which the teacher is responsible for all phases of instruction either in several areas, as in the case of the self-contained classroom teacher, or all aspects of one area, as in the case of the departmentalized specialist, is highly resistant to innovation of any kind. In those places where massive, multi-dimensional efforts have been made, however, significant changes have taken place in the life of the students.

We have the armory to suggest a vastly different education than we now have. To learn whether we are really ahead of where we were twenty years ago we will have to converge forces on educational changes. That awareness is probably our quantum leap from the past.

Chapter Five

The Bureau of Research Models: The Application of the "Systems" Approach [a]

At this time, the bulk of the experience in broad-scale systems planning of performance-based teacher education lies in the products of the bureau of research teacher education program.

The following descriptions of these projects is largely taken from Chapters Two, Three, and Four of "Implementing Systems Models for Teacher Education: Strategies for Increasing Feasibility." (Teachers College: 1971) Final Report of Project No. 00774, U.S. Department of Health, Education, and Welfare, Office of Education, Bureau of Research.

The material describes the assumptions made by the systems planners, the types of performance models of the teacher which were developed, and the characteristics of the program strategies which were developed. It attempts to identify the types of tasks necessary to make feasible the implementations of the Bureau of Research Models developed by teams working at:

Florida State University
University of Georgia
University of Massachusetts
Michigan State University
Northwest Regional Educational Laboratory
University of Pittsburgh
Syracuse University
Teachers College, Columbia University
The University of Toledo
The University of Wisconsin.

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[a] References in this chapter all relate to Bibliography "G" which contains the reports of the Bureau of Research projects.

The Assumptive World of Systems Planning in Teacher Education

The set of common aspects of the program models reflect an assumptive world which is made up of three parts: (1) a commitment to the application of systematic, future-related planning procedures to education, (2) a commitment to bring educational training to bear directly on the revision of public education, and (3),(even more) of an awareness of the possibilities of contemporary management technology. An individualized, let alone a personalized program can not really be conceived of for a large student body without the capacity to obtain and store vast amounts of information about students and to maintain and deliver a wide variety of alternative instructional experiences as appropriate.

Thus, although educators have talked about individualized curricula for decades they have not lived in a technological world which would enable a really thorough form of it. Nearly all successful forms of individualized instruction have depended on a very favorable instructor-student ratio and even then the instructors have to be highly competent and committed to individualization and personalization.

Quality control has been similarly limited. Although curriculum theory has postulated for many years that there should be direct linkages between behaviorally-stated objectives, instructional alternatives, and evaluation processes, the actualization of this paradigm has not really been possible. For example, even a committed instructor teaching a course to twenty students simply cannot manufacture enough tests by himself to track progress adequately and adjust instruction to the varying rates of progress of his students.

With the advent of technologies for developing large and complex information-storage-and-retrieval systems there arrived also the capacity to develop management systems which could coordinate student characteristics and achievement with instructional alternatives and maintain reasonable levels of quality control. Very few educators have as yet become familiar with these technologies, partly because they are new and not yet disseminated throughout the education community and partly because many educators equate "management systems" with "dehumanization," and have reacted adversely.

It is safe to say that all the program model teams are comfortable with the idea of management systems and believe that when we learn how to use them we can make education much more flexible and human.

Thus, they live in an assumptive world in which one looks for ways of developing "support systems," "choice points," and "feedback systems," and they develop training in "simulators" with "recycling to a more appropriate alternative" and "increasing complexity of instructional tasks." In other words, they attempt a massive task analysis of the problem of preparing a teacher, confident that a task analysis can be made and that management systems can be created to implement the results. They recognize that enormous quantities of jargon will be needed to symbolize the concepts of objectives, modular curricular alternatives, evaluation and support systems necessary to such an effort. They believe that such a technology will eventually not only permit instruction to be tailored to individuals but also will enable the student himself to shape many instructional goals and means.

Hence, the "model developers" live in an assumptive world comprised of management systems theory, a concern with efficiency and systematic training (the world of cybernetic psychology, actually), and the belief that the results of applying these to teacher education will be a more personal environment for the student, a more effective teacher-product, and a university in which desirable innovation can be made (cycled into the system) much more easily than is true of the present organization.

Common Working Hypotheses

The teams worked independently and completed their reports within a very short span of time. However, in addition to their use of systematic planning procedures, the ten teams operated on certain implicit but common working hypotheses about teachers and training programs, although they differed considerably in the ways they applied these assumptions to teacher-education program development. These common hypotheses are manifested through the program reports and represent basic but tentative assumptions which implicitly formed either a common frame of reference about teaching and training or the basis on which decisions could be made concurrently with the testing of the assumptions themselves.

1. All of the teams viewed the teacher as a clinician in much the sense that physicians are clinicians. The teacher was seen as the possessor of strategies for making instructional decisions, and as the possessor of the needed repertoire of knowledge and clinical skills for carrying out his decision. It was assumed that decision-making competence and interactive teaching competence could be defined with precision and both played prominent roles in the performance models. (See: Michigan State, ComField, Florida State for examples.)

2. Teachers were generally though of as members of clinical teams, and frequently as specialists on those teams. Several of the models provided "career ladders" with places for many kinds of specialists in a career hierarchy. This should not be interpreted to mean that "team teaching," as presently practiced, was seen as a panacea for the ills of education. Rather, it reflects

the belief that colleagual relationships are necessary so that teachers check one another's opinions, examine one another's teaching, coach one another, and specialize in order to increase competence.[1] (See: Georgia, Toledo, Wisconsin, Massachusetts for descriptions of teams of specialists.)

3. All of them assumed that it is possible to define the needed competencies of the teacher in terms of specific behaviors and to match those behaviors with specific learning experiences, especially short instructional modules calculated to achieve those objectives. Furthermore, it was assumed that large sets of instructional modules could be combined into curricular systems which could be entered at many points in the teacher-training process and could be prescribed to match the personal characteristics of the students who were preparing to be teachers. It was assumed that objectives and the specifications of modules could be stored in automated data banks so that they could be retrieved on the basis of diagnoses shared in or even made by the teacher trainee himself.[2]

4. It was assumed that management and control systems could be developed to monitor such teacher-training programs and to provide them with flexibility, especially adaptability to the student. In several cases, the models included the specifications for computerized systems for managing programs including several thousand behavioral objectives matched with an equally large number of instructional modules. (See: Florida, Syracuse, ComField for succinct descriptions.)

5. All of the models assume that any teacher who could take major responsibility in a classroom would need a long period of training and that a consortium of colleges and school districts was necessary to provide the conditions for academic training, pre-service training, internship or practice teaching, and continuing in-service education. They also assume that an educational team will contain personnel of more limited functions whose training could be relatively brief.

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[1] The conception of the teacher articulated by Robert Schaefer in The School as a Center of Inquiry (New York: Harper, 1967).

[2] The Michigan State Model, for example, contained more than 2700 behavioral objectives matched with instructional modules, all organized within an automated retrieval system. Toledo selected over 1400 objectives from a list of over 2100.

6. All of the teams made a heavy use of simulation laboratories--situations which are somewhat less complex than the "real world of the teacher" in order to teach clinical skills. The "real world of the classroom" is considered entirely too chaotic to function as a setting for learning complex teaching skills. The simulation laboratory, by simplifying the training situation, permits teaching skills to be acquired sequentially until the teacher has a range and depth of competency to cope with and learn in the complexity of the school situation. The models tend to prescribe a sequence of activities which proceed from an identification of a clinical skill, its practice under simulated conditions or with small groups of students, and then its practice in a field situation. This kind of pattern, replete with systematic feedback and assessment, occurred again and again in all ten of the models. (See: ComField, whose plan centers about the use of teaching laboratories.)

7. All of the teams hoped to make available to the teacher knowledge from the behavioral sciences which he could use to make and carry out educational decisions. They saw the teacher as an applied scientist in a basic sense of the word, using behavioristic techniques to plan for students and to select appropriate experiences for them. At the same time they were acutely conscious of the limits of our knowledge both about teaching and about preparation of teachers. Hence most of the models included a large variety of strategies for preparing the teacher and all of them were designed to equip him with a large repertoire of teaching strategies from which he could select for use with his students, as well as with techniques he could use to study the effects of his teaching. (See: Teachers College for explicit positions in this area.)

8. Last, it was assumed that a model should contain provisions for revision and redevelopment as a fundamental feature--not as a subsidiary element or aftergrowth. Replanning and reimplementation are assumed to be basic, as basic as training components themselves. Also, all of these models were created within a very short period of time, and each of the teams was acutely conscious of the need to build a structure that could be revised and further developed. Consequently, various aspects of each model are better developed than other aspects. In some cases, the behavioral objectives are elaborately specified, but much work remains to be done in the development of instruction systems to achieve those objectives, although the basic strategies are laid out. In other cases, a great deal of attention was paid to the development of management systems although much remains to be done to build satisfactory behavioral objectives and instructional modules to complement the well-developed management systems.

The Nature of the Performance Models

A performance model is an integrated set of behaviors which are coherently related to each other. This system of behaviors constitutes the product which the educational program is designed to achieve. When the desired end-product of a program has been described as a functioning system of performance-in this case, a working model of a teacher-then it is possible to begin the substantive development of the means of the program.

There are great difficulties to the development of a "system" description of a complex functionary like a teacher. We can underline these difficulties by identifying the conventional ways of developing conceptions of complex jobs and the obstacles to applying these to the description of the teacher. There are four general ways of developing performance or working models of complex functionaries. One of these is by the empirical study of a functionary. To develop a model of a salesman (for example), we might study the most successful salesman (salesmen) of a given product (the one whose dollar sales were the highest) and determine his (their) behaviors. A second method is to obtain a consensus by members of a field about the characteristic or optimal behavior of functionaries within the field. Again, using the case of a salesman, one might ask outstanding salesmen what behaviors were responsible for their success, or ask regional sales supervisors what makes the best salesmen so effective. A third is to derive the model from the application of a theory, either an empirically-verified theory, or a deductive construction. Again, with respect to salesmanship, one might study social psychological theories about the kinds of factors which bring about sales with the object of training salesmen to bring about those conditions. Selecting a theory, one would deduce the properties of the salesman from it. Hence we would have (do have) theories of salesmanship based on rapport-building activity (make friends with the client), on behavior-modification (shape the client!), on status-linked behavior (make the client feel he will lose face if he doesn't buy) and so on. The fourth method is to make a comprehensive analysis of all the processes engaged in by the functionary. Such an analysis draws on theories, consensus, and the application of empirical studies where appropriate. To develop a model of an airline stewardess, for example, we might analyze the aircraft and the equipment, work out a description of services which might be offered during flight, check customer and supervisor opinion, and build, from those data, a simulator in which we could try alternative patterns of behavior until a satisfactory combination emerged.

Ultimately, the application of systems procedures to the development of a training program requires the fourth course of action. We are not ready for this course as yet. There are relatively few comprehensive empirical studies as yet of what teachers do and there is still little knowledge about the kinds of procedures which are followed by the most able teachers. (In fact, how to identify effective teachers is a question which has by no means been resolved!) There is, in fact, considerable controversy about what criteria of performance to use. Complicating the situation is the position taken by many educational leaders, such as Arthur Combs[1], that the most effective teachers are those who are most fully themselves, and have developed a style which actualizes their personality. This position almost denies that there could be agreement on the performance of a capable teacher, for they would be unique artists, actualizing themselves and facilitating the actualization of their students through unique interaction. Also, there is not yet a sufficient theoretical base, particularly one grounded in empiricism, to permit a full description of the efficacious teacher in terms of a theoretical model about the conditions which produce learning. Yet, there are sound theoretical positions about learning and training, and many of them are empirically grounded. The work in this area simply is not complete, but there is much to build on.

Each of the teams of model-builders had to reconcile themselves to our present state of knowledge and the lack of agreement on conceptions of the effective teacher. All worked under the serious limitations of time, or they probably would have engaged in major studies to create more comprehensive analyses of the teacher function. Yet, considering the time limitation, the analyses actually engaged in are remarkably complete and strikingly similar, although the range is instructive. In their work, we can see variations on each of the four common ways of developing performance models.

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[1] Combs, Arthur, The Professional Education of Teachers: A Perceptual View of Teacher Preparation, Boston: Allyn and Bacon, 1965.

Each team of model-builders made a set of choices which narrowed the ground he had to search as he tried to develop a performance model. The approaches which resulted are interesting in their diversity, but also in their common belief that it would be possible to develop behavioristic performance models of teaching. They all shared the belief that a complex professional functionary would have to be a decision-maker and a clinician, in the same sense that a physician is both of these things. (He decides and he executes.) They all envisioned a person of far greater responsibility and capacity than is ordinarily the case in the teachers of today's schools. They consequently envisioned not only a teacher who is different from today's average classroom teacher, but a school organization which is considerably different. This projected change requires that school districts make operational changes in order to make a setting for implementing the programs and making effective use of their graduates. The models tended to assume career hierarchies, ranging from the more simple to the more complex functions within team structures, which also assume changes in the school.

Criteria for Effective Performance Conceptions of the Teacher

To function effectively as the goal of a program, the performance conceptions need to be behavioral and unified, and to represent a working model of the teacher. Behaviorality is essential in the construction of a systematic program. A general behavioral specification provides program direction and permits a task analysis into behavioral elements (specific behavioral objectives). This enables training procedures to be matched to behavioral elements in a modular, managed plan.

Unity refers to the internal consistency of the performance conception and the "fit" of its major components to one another. Unity provides distinctive direction to a program and consistency among its parts--thus it increases the power of a program by providing for cumulative impact of program components and clarity of direction to faculty and students.

The "modelness" of the performance conception--the adequacy of its representation of a functioning teacher provides for the integration of specific competencies as they are developed in the program so that they work together. When one considers the complexity of the programs to prepare teachers which result from systematic planning--almost 3,000 modules in some cases--it is no mean feat to ensure that such a myriad of behaviors become related, in the trainee, so that he can operate effectively. One of the considerable potentials of systematic behaviorism in program planning is in this area--the creation of a program whose training products (achieved behavioral objectives) become related into a real-life teacher who replicates the idealized conception of the teacher. One of the great difficulties of the traditional training program has been the lack of such a performance model and the unrelatedness of program elements or their lack of coordination (learning psychology at a time far removed from its application, for example). Unless the systems planner develops a clear, comprehensive conception of the performing teacher, the advantages of systematic planning will not be realized.

This conception has philosophical as well as practical implications, for the kind of teacher who results should reflect a philosophically acceptable view of education. A teacher is a creator of environments for children--he creates a large part of the world of childhood. This is of such importance that we must be able to accept the philosophical underpinnings of the model of the teacher as well as the practicality or workability of the model.

These three criteria: behaviorality, unity, and "modelness" will be applied as we discuss the conceptions of the teacher that were developed.

The Pittsburgh Approach
An Individualizer of Instruction

The Pittsburgh team selected the individualization of instruction as the focus of teacher training. They decided to build their performance model around a conceptualization of a teacher who could individualize instruction and who would work in schools organized to tailor instruction to individual students. They describe individualized instruction as follows:

> Individualized Instruction. The central theme in the elementary instructional programs for which the new model will train teachers in individualization. This term covers any arrangements and procedures that are employed to ensure that each pupil achieves the learning goals designated for him. The definition of individualization used in this model is as follows: Individualized instruction consists of planning and conducting, with each pupil, programs of study and day-to-day lessons that are tailor-made to suit his learning requirements and his characteristics as a learner. This definition focuses on instructional planning with and for each individual student

> before teaching him, then teaching him according to the plan.[1]

Six features of individualized instruction programs were identified and the Pittsburgh program is designed to teach the future teacher how to bring about instruction that has those characteristics.

> 1. Instruction is organized in terms of programmed curricular units rather than courses, with the units in each curricular area arranged in a specified sequence.
>
> 2. On the basis of achievement pretests and the diagnosis of learner characteristics, lessons are tailor-made with each pupil rather than being planned for a group.
>
> 3. Several modes of individualization are employed, singly or in combination, in suiting instruction to the individual pupil: varying learning goals from pupil to pupil, varying learning materials and equipment, varying the learning setting (independent study, pupil team, tutoring by the teacher, small group working without the teacher, small group with the teacher, large group), varying instructional techniques, assigning different students to different teachers, and varying the rate of advancement through the curriculum.
>
> 4. Each pupil is expected to master a learning task before proceeding to the next task; mastery is determined with use of a unit post-test. The criterion score for mastery is empirically determined in relation to performance on subsequent tasks.
>
> 5. Teachers offer pupils help chiefly on an individual basis, and are always available for consultation.
>
> 6. The pupil conducts most of his learning independently of the teacher, employing self-direction.[2]

Whether the Pittsburgh team considered conceptions of the teacher other than an individualizer of instruction is not clear from their documents nor do they explain alternative conceptions of individualized instruction or criteria for selecting the one they did.

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[1] University of Pittsburgh, A Model of Teacher Training for the Individualization of Instruction (OE-58017) Washington, D.C.: U.S. Office of Education, 1968. p. 3.

[2] University of Pittsburgh, Ibid., pp. 4-5.

However, having chosen, they proceeded to make a task analysis of the process of individualizing. The task elements that result fit together logically and are almost certainly workable, given certain working conditions.

(It is worth noting that the Pittsburgh design for teacher training utilized the same features that they wish the teacher to employ in individualizing instruction. In other words, the same specifications are used for the teacher performance model as for the teacher education system model, except for the obvious adjustments for client differences.)

To make an operational description, in terms of the specific behavioral objectives for the program, the description of individualized instruction was expanded and made more specific, although the Pittsburgh Model is in general not nearly complete and much work will be done before we can assess it.

The Pittsburgh conception of the teacher assumes a particular type of school with special support systems; it makes no attempt to train a teacher of classes--the Pittsburgh teacher is a teacher of individuals. The teacher is thus seen as a system within a system, which increases the likelihood that their working model will turn out to be feasible.

At the same time, the Pittsburgh conception would not fit any school situation. To take maximum advantage of the competency of their teacher, one has to create a school in which teachers are deployed in an organization which facilitates individualized work and are backed up by support systems which include banks of individualized, self-instructional materials (such as IPI).

The specifications of the Pittsburgh teacher and program are sufficiently incomplete that it is difficult to evaluate the model completely. However, the competencies appear to be behaviorally stated consistently and clearly. The fairly narrow and distinctive description of the teacher as an individualizer lends itself to a relatively unified conception. There may be a message in this, for the Pittsburgh performance model has a unity not achieved by any of the more eclectic approaches (and perhaps not achievable by any broader approach).

As to the extent to which the conception appears to be a working model of the teacher, the Pittsburgh task analysis (which is made clear in several illustrations (pp. 105-107) is straightforward and very tight--with the relatively narrow and distinctive conception of the teacher, this can be organized very clearly.

However, what will happen as the conception is expanded to make a full program is not clear. Is the teacher to be prepared to define and facilitate objectives in *all* areas for *all* learners? Unless some clear limitations are made the specifications even for an individualizer can approach those for a Renaissance Man. If a teacher is a definer and facilitator of any learning goal, then he is probably being defined as a system analyst backed up by a fully-developed system. Pittsburgh seems, as do many of the models, to shade in the direction of a model which may be beyond the capabilities of the human, requiring information-processing and response capability more appropriate to a large organization. As we shall see, several of the other programs also shade in this direction.

The ComField Approach:
A Teacher Who Can Produce Learning

The performance model developed by the team representing the consortium gathered together by the Northwest Regional Education Laboratory describes the teacher in terms of instructional and non-instructional competencies. We shall give attention only to the instructional aspect. The description of instructional competency begins with a description of the teacher as a "person who can bring about learning in children." Or stated differently, "who can bring about appropriate changes in pupil behavior."[1]

In order to make this specific, the ComField team committed themselves to develop a descriptive taxonomy of the kinds of learning that are desirable for elementary school children and determine the kinds of teaching which would be likely to achieve those objectives.

> Having established the prime objective of a teacher education program, the next step is to determine how this objective is to be brought about. In terms of a systematic analysis, this requires four interrelated steps:
>
> 1. specification of the pupil outcomes desired:
> 2. specification of the conditions by which each outcome can be realized:
> 3. specification of the competencies needed by teachers to provide the conditions that are needed for the realization of each outcome: and
> 4. specification of the conditions by which the needed teacher competencies can be realized.[2]

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[1] Northwest Regional Educational Laboratory, *A Competency Based, Field Centered, Systems Approach to Elementary Education*, (OE 58020) Washington, D.C.: U.S. Office of Education, 1968.

[2] Northwest Regional Educational Laboratory, *Ibid*., p. 7.

In order to make a full development of such a statement of performance, the ComField team needed to go through four steps. The first three defined the performance model, or the goals of teacher education, and the fourth developed the teacher education program itself.

Figure 3.1. Steps in Developing a Program: ComField[1]

STEP 1	STEP 2	STEP 3	STEP 4
Pupil outcomes that are desired.	Conditions that bring about the pupil outcomes that are desired.	Competencies needed by teachers to provide the conditions that bring about the pupil outcomes that are desired.	Conditions that bring about the competencies teachers need to provide the conditions that bring about the pupil outcomes that are desired.
The goals of education.	The instructional program within the schools.	The goals of teacher education.	The teacher education program.

Put another way, it was necessary for the ComField team to develop a taxonomy of pupil outcomes, to make postulates about the kinds of environmental conditions that would be likely to bring about those outcomes, to make a further specification of the behavior of the teacher that would produce those environmental conditions.

This approach involves the specification of theoretical or empirically-derived positions about learning. It thus can take advantage of the behavioral sciences, but must also operate under the limitations that exist in our present knowledge about how to bring about various kinds of learning outcomes.

It is worth noting that both the Pittsburgh and the ComField approaches conceptualize the teacher as a behaviorist (all the models do, in fact). The behaviorist conception requires the teacher to specify learning outcome in terms of pupil behaviors, and each requires that the teacher attempt to tailor the environment to the characteristics of the student, and to the particular kinds of outcomes desired. Whereas, the Pittsburgh model emphasized the specification of means for producing outcomes for individual learners, the ComField model includes individualization as a general aspect of educational method, but conceives the teacher in more kinds of roles than Pittsburgh did.

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[1] Northwest Regional Educational Laboratory, Ibid., p. 6.

The ComField conception raises a number of complex questions which have to be resolved before their performance model can be fully comprehended. Two of these stand out. First of all, it is not clear whether every teacher is to be responsible for bringing about any learning outcome with an appropriate strategy for every learner. This is a really crucial question, for there are myriad types of learning and a vast number of potential strategies for bringing these about. The model seems to lead to an unmanageably complex functionary.

The partial answer to this is found in ComField's expectations of the future.

> In order to plan an instructional program meaningfully, some prediction as to the nature and purpose of education in the 1970's and beyond has to be made. Two predictions have been agreed to by the planners of ComField.
>
> 1. A functional science and technology of education will evolve, and it will bring with it an educational program that is markedly different from that which is now found in most schools. Two differences are anticipated: 1) the widespread use of pupil-materials instruction, and 2) the application of systems technology in the design of instructional experiences. Out of both will grow the application of "instructional systems" to the education of children.
>
> 2. Three major classes of educational specialists are anticipated: 1) instructional analysts, 2) instructional designers or engineers, and 3) instructional managers. As presently conceived the instructional analyst will be the member of the instructional team primarily responsible for identifying the classes of pupil outcomes for which the school should be responsible, and the instructional conditions that bring them about; the instructional designer-engineer will have the task of developing instructional systems to bring these outcomes about; and the instructional manager (IM), will bring the effort of the first two members to bear upon the educative process. The task of the IM is viewed as one of creating and/or maintaining an instructional environment that brings about learning in children. The IM's specific function within the school is likely to be primarily a supervisor of the instructional process rather than the prime manipulator of it. Operationally this means that while the IM

> of the future must be able to diagnose learner readiness, prescribe appropriate learning experiences, evaluate their effectiveness and prescribe next learning steps, he must also be able to apply the instructional systems developed by the other members of the educational team, supervise instructional assistants, use electronic and computer media, etc.[1]

Thus, ComField's teacher is an instructional manager who works in an environment which increasingly consists of student-material relationships with a presumed vast storehouse of instructional possibilities which are mediated through instructional systems. This greatly changes our view of him. Thus, the second question which has to be resolved involves determining the nature of responsibility when a teacher supervises rather than manipulates instruction. Is not the system the primary agent? At times ComField speaks as if the teacher were the kind of broadly-responsible agent we are familiar with in the traditional literature of teacher education but at other times he appears to be one of a large group of supervisory technicians in a kind of large warehouse of self-instructional materials.

Thus, while the model is quite behavioral and unified, there appears to be an ambiguity which could, if cleared up, improve the functional quality of the conception. It appears to us that if the teacher is to work in the kind of environment ComField specifies, then his role can be defined much more narrowly and thus a more feasible goal will result.

As these questions are resolved, the model of the teacher will be in sharper focus and programs to achieve the model will be more clearly feasible.

The Georgia Approach: Working from the Objectives of Elementary Education

The Georgia model was developed by conceptualizing a desirable kind of elementary education and identifying the teacher performance which would be necessary to bring that kind of elementary education into existence.

To do this, the Georgia team began with the identification of seven broad objectives of elementary schools. These in turn were used to determine the kinds of conditions that would be likely to lead students toward those objectives. From those conditions the teacher job analysis was made. ("What should the teacher do to produce those conditions?" was the question asked.) Then the job analysis was broken down into specific teaching behaviors. The six goals of elementary education are:

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[1] Northwest Regional Educational Laboratory, Ibid., p. 18.

1. Providing the student with the tools of learning necessary to meet his current obligations and for his continued development towards becoming a lifelong learner. Tools include skill in reading, writing, listening, speaking, computation, observation, and the more advanced processes of comprehension, discrimination, application, analysis, synthesis, and evaluation. Tools, also, include the understanding and appreciation of the arts, and the skills necessary to maintain adequate physical and mental health.

2. Assisting the student to understand his social and physical world. A basic knowledge of the social world includes an understanding of the institutions of society, their interrelationships, and their relationship to the individual. It also includes an understanding of the make-up of society, its religions, ethnic and racial groups, and the influence culture has on the development of the individual. Basic knowledge of the physical world involves knowing how natural laws and one's environment affect the society and the individual, and how one adapts to his habitat.

3. Developing the foundation for good citizenship. Good citizenship consists of an understanding of the democratic process, respect for each person as an individual, and a respect for the rights of others. Knowledge and understanding of the foundations upon which the society has been built and insights into the evolutionary nature of society provide the student with a grasp of his own role in the society. Good citizenship further implies that the individual will become a contributing member of the society capable of rational thought and action.

4. Developing the basis for effective human relations. An essential function of human relations in the elementary school is to help the growing child to know and to understand himself and to grow in healthy attitudes of self-acceptance. While learning to accept himself, it is equally important that he learn to understand and accept others and to be concerned for their welfare. He must realize that all society is based on interaction with others, and consequently, that society is healthy and productive insofar as the interaction is healthy and productive.

5. Introducing the process of change and its relationship to the individual and the society. Effective change is impossible without both the ability to think and to communicate with others in group situations. In an era of rapid societal change such as we are now experiencing, these skills become particularly crucial. Consequently, the elementary school must help children to study events, to place a value on them, and then to make wise decisions as to their own action in relation to them. They must be able to glean from the past that which is realistic for progress in the future. Thus, they must be equipped with the processes necessary for problem solving, and they must be skilled in the processes of communication and group interaction.

6. Assisting the student in developing a personal value system that will enable him to make rational choices. Man's relationship to other men and to society as a whole is largely determined by the attitudes and values that he holds and the worth he places on them. In this area, the elementary school has the responsibility of helping the child to analyze his environment and from this, to discern those attitudes and values that he can accept to be true because they are conducive to the common good. Essential here are the notions of the worth of man, the value of property, social justice, etc. However, in an era of rapid change, it is particularly important that the child be helped to rationally distinguish what is right, rather than what is said to be right. Thus, it is essential that the child have the skills necessary to be aware of the disparities of human circumstance and the skills necessary to identify and to correct unsatisfactory notions. Only in this way can he develop those attitudes and values that will promote effective citizenship and progress toward the common good.[1]

The products of neither Phase One nor Two provide us with information about how these goals were identified, but it is stated that they are generally agreed on by educators.

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[1] University of Georgia, Georgia Educational Model Specifications for the Preparation of Elementary Teachers, (OE-58019) Washington, D.C.: U.S. Office of Education, 1968. p. B-4, 5.

The six goals provided the framework from which elementary school objectives and pupil learning behaviors were identified. Both of these tasks (identifying objectives and pupil behaviors) were accomplished by specialists within the College of Education at the University of Georgia. These specialists worked in content area teams (reading, arithmetic, etc.) which resulted in objectives and pupil behaviors within the framework of the curriculum areas which characterize the present elementary school. For example, Figure 3.2 (see page 97) gives an example of the working procedures used to develop this performance analysis.

Objective

To learn to solve problems.

Pupil Learning Behaviors

1. The child identifies problems.
2. The child formulates hypotheses.
3. The child gathers information.
4. The child analyzes data.
5. The child evaluates alternative solutions.
6. The child generalizes solutions.

Teaching Behaviors

1. The teacher organizes problem situations.
2. The teacher interests pupils in problem and observes its formulation.
3. The teacher observes information gathering and processing.
4. The teacher assists, as required, in developing a solution to the problem.

Suggested Specifications for a Teacher Education Program

A teacher education program will provide the student with:

1. Knowledge of and skill in developing problem situations.
2. Knowledge of and skill in techniques of presenting problem solutions methods.
3. Knowledge of and skill in critiquing problem solutions.

Figure 3.2. Cognitive Processes--Specifications Work Sheet

University of Georgia, Ibid., p. III-3.

3

Consensus of experts was used by the Georgia team to identify the elementary school objectives and the pupil learning behaviors from which the job analysis was derived.

The overall method for developing the specifications is clear enough--teams of specialists identify school objectives, from those desirable pupil behaviors are generated and then, in turn, teacher behaviors and competencies are developed. The result is that the substantive conception of the teacher grows in small pieces. This has advantages and disadvantages. An advantage is that the job can go on in manageable pieces. A team can identify one goal and go straight through until the competencies related to it are identified and matched with performance modules to constitute the substance of the program. This produces a "vertical" consistency of all modules and the overall goals.

There are several problems with this method which can, however, be overcome.

First, the selection of the content areas greatly affects the nature of the competencies which result. What should be the areas? If one weighs philosophy and the arts heavily, the competencies will be weighted on that side. The possible content areas are very large. The process of selection of the content teams should be fully rationalized and made transparent. In addition, potential relationships among the areas should be made clear. Further, a system for relating the work of the teams to each other needs to be employed so that needless dublication is avoided and the languages of the teams can be related to each other. The Georgia program as it stands doesn't provide a rationalization for the selection of the content areas nor a system for relating the work of the teams (except for a system to make relatively uniform the concepts used to describe specifications.)

As a consequence, the Georgia conception of the teacher is constructed of sequences of small units within separate content areas. Moreover, there is no clear plan for sequencing, so that the relationship among the units must be inferred from examining them.

In the course of implementation these problems should be faced directly and solved. Before performance modules are developed an integrated conception of the teacher should be developed (quite possibly by developing an integrated conception of the goals of the elementary school). The content areas should be rationalized in terms of this unified conception and a system developed for relating the specifications in the several content areas to each other. In addition, systematic plans for sequencing within the content areas would ensure that the units of behavior add up to a solid performance in each area.

In the course of making their analysis, the Georgia team decided that no one kind of personnel could engage in all the behaviors that were being identified, and they were developed into four major categories for elementary school personnel: aide, teaching assistant, certified elementary teacher, and specialist. Each of the levels implied competency at the previous levels, and the four categories provided a career hierarchy for instructional personnel within the elementary school. The education-career combination can be seen in Figure 3.3 (see p. 100).

The Georgia team attempted to achieve behaviorality and standardization of form in stating objectives for the program by specifying for the cognitive, affective and psychomotor domain hierarchical behavioral levels (taken in the first two cases from the Taxonomies of Educational Objectives) and using them to state objectives for the types of teachers (aide, teacher, specialists) identified for the program. For example:

Characteristic	Level of Development					
	Cognitive			Affective		
	T.A.	Tch.	Spec.	T.A.	Tch.	Spec.
3.15.16 Curricular Programs for elementary school science		3	6		3	5

Figure 3.4. Performance Specifications--Science[1]

This means that the teaching assistant requires no development in this area, that teachers do at cognitive level 3 and affective level 3 and specialists at cognitive level 6 and affective level 5. In one sense this device does assure behaviorality and uniformity in the statement of specifications. However, it remains to be seen how general behavioral descriptors (cognitive level 3, for example) can function over a variety of types of characteristics or content. This will have to be worked out in development.

Unity of conception is enhanced by the clarity of the steps which Georgia used to develop its specifications--proceeding from the goals of elementary education straight through to the objectives of the school, behaviors of children, and hence to the behaviors of the teacher. However, by developing the actual specifications through content or curriculum-area teams working separately in their areas, what resulted is undoubtedly a clear job specification of the teacher, which is what Georgia was after, but not necessarily a working model of the teacher. The mass of specifications which resulted--over 2500 in number--need to fit together organically.and

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[1] University of Georgia, Ibid., p. III-81

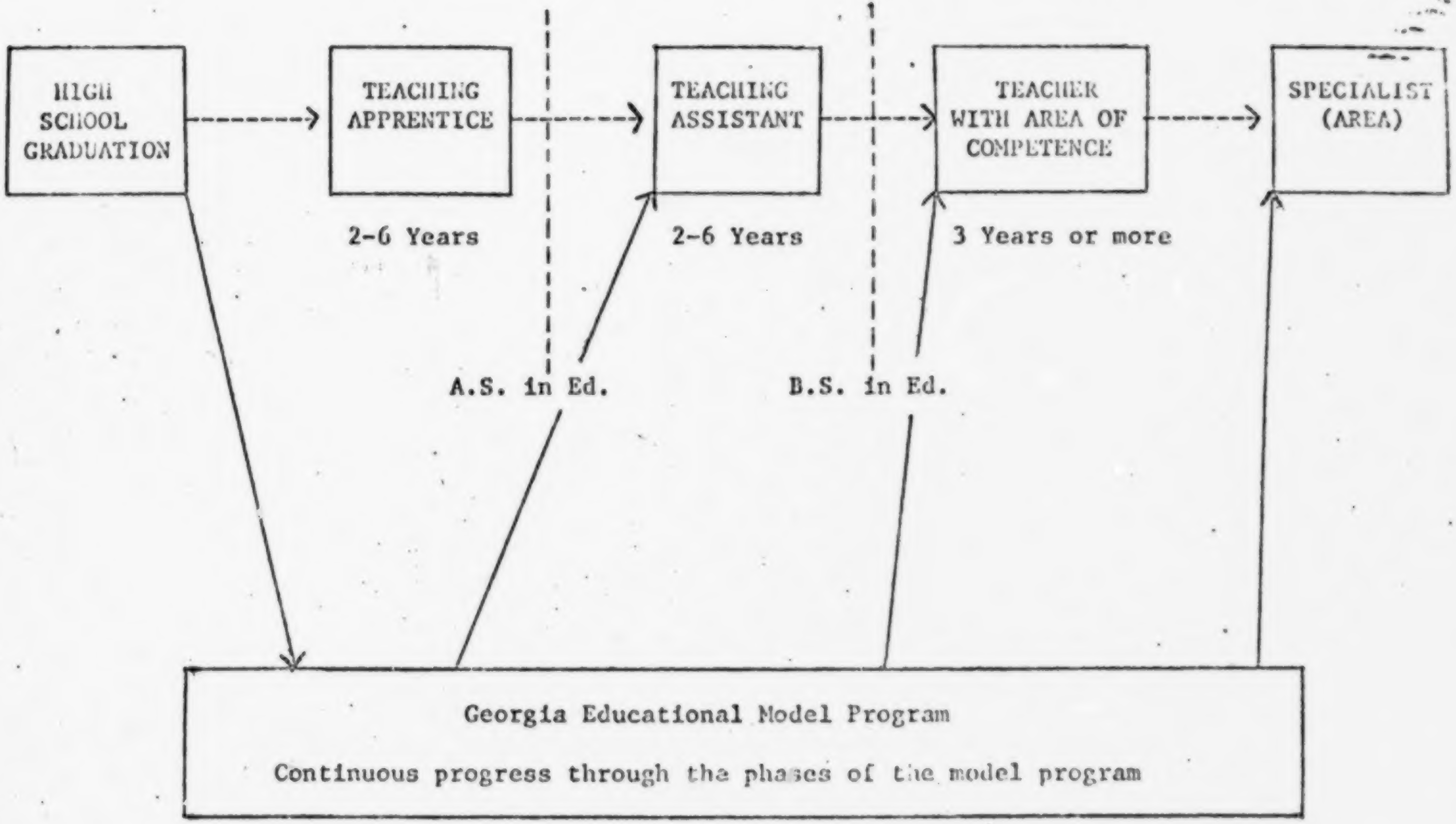
HIGH SCHOOL GRADUATION
TEACHING APPRENTICE
TEACHING ASSISTANT
TEACHER WITH AREA OF COMPETENCE
SPECIALIST (AREA)
2-6 Years
2-6 Years
3 Years or more
A.S. in Ed.
B.S. in Ed.
Georgia Educational Model Program
Continuous progress through the phases of the model program

Figure 3.3. Paths in the Teacher Career Field

University of Georgia, Ibid., p. II-5.

it is difficult to tell at this stage of development whether that will be the case. During fuller development and implementation it is essential that this be accomplished.

The University of Toledo Model: The Teacher As a Team Member

The Toledo group developed their performance model by describing a clinical team of teachers in action and by analyzing the functions of a team member:[1]

> ### A New Role for the Elementary Teacher
>
> Simply stated, the prime functions of the teacher are the transmission of knowledge and the transmission of values. As previously mentioned, both cognitive knowledge and societal values and norms are becoming increasingly complex. When attempting to fulfill his task as a transmitter of values and norms, the teacher must not only mediate between the child's world and the adult in an effort to close the ever widening generation gap, but he must also deal with a serious cultural gap. The cultural gap is especially important when the student's cultural background is markedly different from the teacher's. When norms are in a state of flux, as in our attitudes toward sex and drugs, the teacher may not feel competent to force his values upon the pupils. When the teacher attempts to fulfill his function as a transmitter of knowledge, he is again caught in the web of rapid change. It seems clear that if the teacher is to fulfill these two functions successfully, he will need help.
>
> ### The Teacher As a Team Member
>
> If the elementary teacher is to maximize his effectiveness in the transmission of cognitive knowlege, he will need to be a member of a team - a team made up of specialists. The purpose of the team would be to design instructional systems. An instructional system is a strategic complex of human and nonhuman components which are dynamically interdependent and interrelated and work together to attain a particular instructional goal or set of goals. The instructional system receives

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[1] University of Toledo, Educational Specifications for a Comprehensive Elementary Teacher Education Program (OE) Washington D.C.: USOE, 1968, Vol. I, pp. 61-62.

inputs from the external environment, processes these inputs in a prescribed instructional environment according to strategies derived from research and expert opinion, so that the output generated will have a high probability of achieving the prescribed goal or goals. The instructional system components may include some or all of the following: learner(s), teacher(s), mediated instructional materials, assessment and feedback instruments, information processing and displaying machines, support technician(s).

The key to this arrangement is the team. Instructional decisions are made cooperatively by a team of specialists with a master teacher serving in the role of instructional specialist throughout the entire instructional system design process. Each team could serve a number of master teachers. For example, in a building of thirty teachers and nine hundred pupils there could be six master teachers all of whom were served by the same Instructional System Design team.

The membership of the ISD team would vary depending upon the needs and background of the pupils, e.g., a slum school would probably need the services of at least one sociologist or an elementary school near Cape Kennedy might require a specialist in space technology in order to take advantage of the children's knowledge of space science which they learned at home. Some of the specialists that would very likely serve at all instructional systems design would be:

1. Subject matter specialist	To update the subject matter.
2. Curriculum specialist	To determine the mix of what to teach to whom.
3. Research specialist	To evaluate the instructional system's efficiency in terms of the output produced and to collect and feed back data needed to redesign the system; to calculate cost/effectiveness estimates of alternative instructional strategies and systems.

4.	Educational sociologist	To interpret the social and cultural milieu of the child.
5.	Educational psychologist	To study the child's growth and development and his individual learning patterns.
6.	Instructional technologist	To design, develop and test modules of mediated instruction.
7.	Administrative specialist	To meet the administrative and managerial needs of the team.
8.	Information Management Specialist	To develop information storage and retrieval systems, computer based information management system, and computer simulation techniques.
9.	Counseling and Guidance Specialist	To fill the guidance and counseling needs of the students through and with the help of the teachers.
10.	Pupil Evaluation Specialist	To specify in behavioral terms the goals for each pupil, to assess the progress of each individual pupil and to make recommendations to the ISD team for modifications of the pupil's program.

The next step was to develop complete models of each of these roles and to fit them together again in a model of a smoothly functioning team.

Toledo thus imagined, as did ComField and Pittsburgh, a school which is organized in sets of instructional systems and staffed by teams of developers who constantly evaluate and improve the system and work with teachers to tailor learning environments to children.

As in the case also of ComField and Georgia, a massive list of behavioral objectives were developed. The result is a massive list of "working parts" of the teacher but there is no general, overall description of the functioning teacher which can provide a model-like, unifying structure which can serve to integrate the elements of the program.

Thus, the feasibility of the program would be increased enormously if general models of the team members were built--models that could integrate the enormous variety of job specifications that resulted from the project. The description of the team itself, which provides a good point of departure, is not enough in itself--models of its functioning parts need to be developed.

The Michigan State Model:
The Application of the Behavioral Sciences to Teaching

The Michigan State model gave the greatest emphasis to the teacher as an applied behavioral scientist. The teacher was seen as a scientist in the classroom, creating and testing hypotheses. The Michigan State team's description is directly to the point:[1]

> A key concept of the BSTEP model is clinical behavior style. The major function of this concept is to regularize the behavior of teachers. Clinical behavior style denotes those particular and stylized sets of activities and mental processes which a practitioner possesses. Such a practitioner of education will be specifically trained to utilize his client-related experience as the basis for continuous learning and improvement of his skills as a teacher. The clinical behavior style which is appropriate for a professional teacher consists of six phases: describing, analyzing, hypothesizing, prescribing, testing, and observing consequences. The last phase, observing consequences of the treatment administered, leads in turn to the first by a process of recycling in order to describe the changed situation.
>
> The progressional foundations of the program are centered on the behavioral sciences for two reasons: (a) The dominant task of all educational activity is to develop pupil behavior within various settings. The behavioral sciences provide the systems of knowledge and inquiry most relatable to this task. (b) A distinctive feature of empirical science as a way of acquiring

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[1] Michigan State University, Behavioral Science Elementary Teacher Education Program (OE 58024, three volumes) Washington D.C.: 1968.

knowledge is that it is self-corrective.

The teacher was seen within this concept in terms of three processes: proposing, doing, and reflecting. He would identify problems, propose solutions to them and reflect on the situation. Starting from this view of performance, the Michigan State team proceeded to identify the competencies needed to apply the behavioral sciences to the solution of educational problems. The total number of competencies reached more than 2700 by the time the team had completed the work. The procedures followed ensured a high degree in behaviorality, especially considering the fact that teams worked in the humanities, where a behavioral tradition is not only rare, but often scorned.

The "clinical style" and "applied behavioral scientist" served to unify the program's specifications and provide a kind of working model of the teacher, although the large number of teams which developed the specifications of necessity had to do much of their work separately.

In the feasibility study a management system is proposed which will include clear and rigorous testing of each module to ensure effectiveness and redevelopment. It should be possible to augment this to include a study of the interrelationships of the behavioral elements and their integration into the clinical behavior of the teacher. This would provide for the empirical augmentation of the clinical model and lead to its testing and the subsequent development of procedures to increase the integration of streams of development. We will deal with this question more extensively in the next chapter as we explore ways of increasing the feasibility of program strategies.

The behaviorism and a clinical view of teaching found in the Michigan State model was common to various models as was the range of concepts used. The other model builders, Syracuse, Massachusetts, Florida State, and Wisconsin, shared many elements with this conception.

Massachusetts

The Massachusetts conception of the teacher describes teaching in terms of three components: Human Relations, Behavioral (Teaching Skills), and Content. In itself, this tripartite conception is imaginative, and all three aspects can be defended as important to teaching. Giving such prominence to human relations represents an important contribution to conceptions of the teacher. However, the selection of the three components is not explained, nor are they related to each other. Some philosophical and psychological underpinnings are provided in the human relations area, but not in the others. Thus, a promising idea does not result in a real working model of the teacher, although we believe this problem could be remedied.

Within each of the three areas behavioral elements of teaching are specified as objectives of the teacher education program. No provision is made for relating growth in one area to either of the others. Nor are the skills, knowledges, and values within any of the areas related according to any general scheme. The eighteen teaching skills, for example, are not described in any particular relation to each other nor is it clear how they were selected from the myriad of possible skills.

The Massachusetts program offers the promise of a model of the teacher but there is curiously little attempt to capitalize on this beginning, and the unrelatedness of the behavioral elements is almost vexing. It should be possible during subsequent stages of development to increase the power of the program by developing a more powerful view of the teacher.

The Massachusetts conception makes a strong contribution in another direction. It is structured so that the program can be adjusted to persons seeking a wide variety of specialties in differentiated teaching staffs. Several types of competency are identified for each specialist and a profile of performance within each specialty. Each type of competency is organized in terms of a sequence of competencies so that students can enter each type at their level of achievement.

There follows a figure from the Massachusetts report which is used for a profile analysis.[1] (See Figure 3.5, page 107).

In the Massachusetts profile analysis, profiles are constructed in several areas for each of several positions within differentiated teaching staffs. The entering student is matched with the desired profile for the particular specialty for which he is aiming, and the diagnosis that results can be used in planning his curriculum. As in the case of the other modular curricular designs, the Massachusetts model links specific learning objectives with instructional alternatives, and the selection of these can be made in relation to the specialties for which the candidate is preparing.

Syracuse

The Syracuse program is structured around a conception of teaching which is to characterize both the teacher who emerges and the program to prepare him. This conception is an "intent-action-feedback-process" model.

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[1] University of Massachusetts, Model Elementary Teacher Education Program (OE 58024, two volumes) Washington D.C.: USOE, 1968, p. 84.

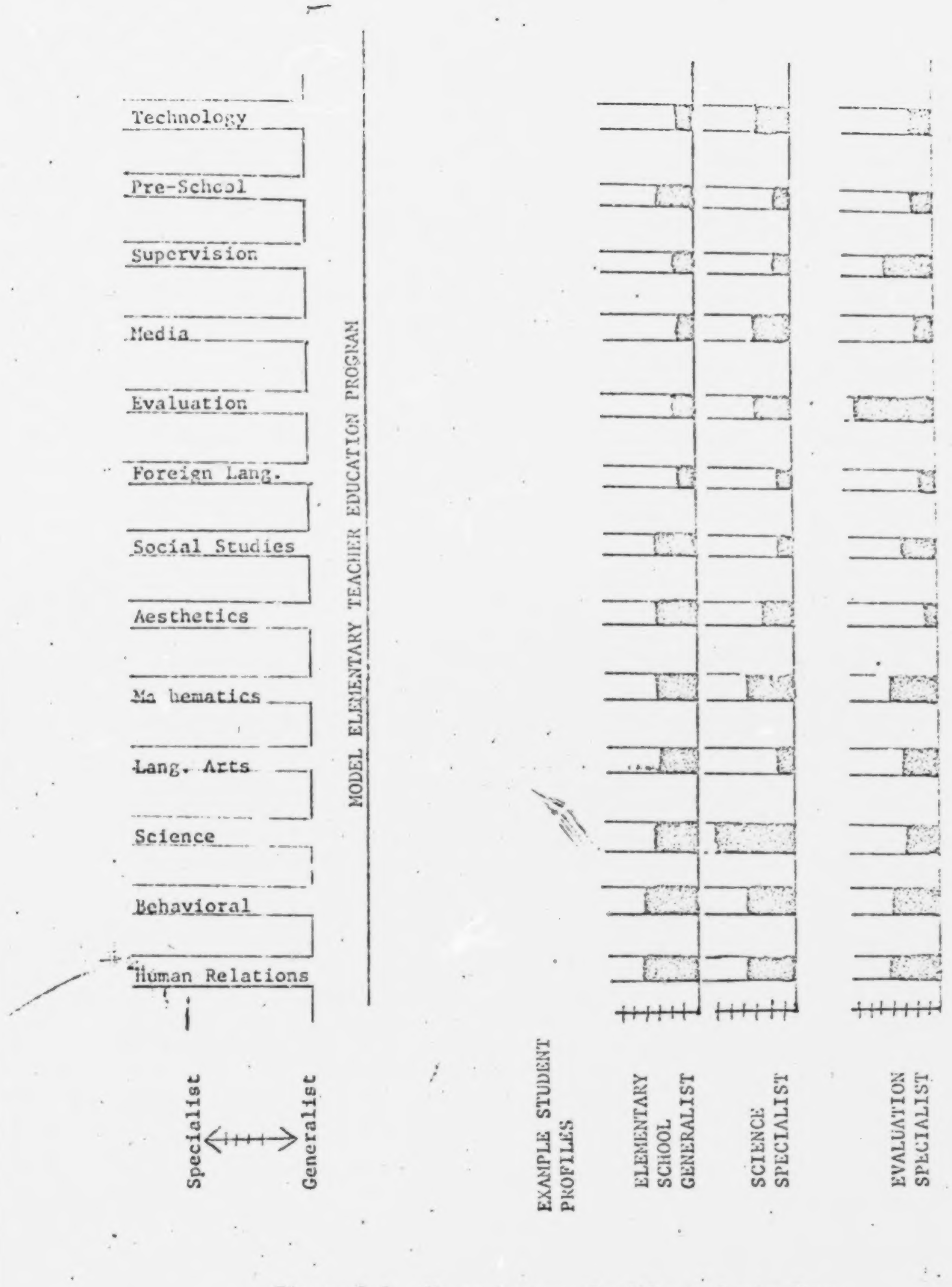

Figure 3.5. Massachusetts Profile-Analysis Chart.

The model program is seen as functioning according to the following patterns. The demands of a changing world will make demands on the program for some kind of relevant response. In the pluralistic situation, we believe there will be a diversity of proposed responses relevant to the situation. This diversity of possible responses will lead to confrontations in an open, inquiring climate. The better alternatives should ultimately prevail. These alternatives will be translated into what have been defined as responsible behaviors, and are characterized as:

A.	Intending	Intent
B.	Acting on the basis of the intention	Action
C.	Accounting for the consequences of the action	Feedback
D.	Using the results of the accounting to modify future intents and actions	Process

The substantive conception of the teacher within the framework of this model is described in terms of seven components, one "liberal" and six "professional."

The Components of the Model Program

The model program is designed as a five-year program. The first two years are devoted to liberal studies. The junior year begins exploratory professional study and continues liberal studies. The senior year is devoted to full-time professional study. The final year, including the summers preceding and following, is seen as a resident year and a period for developing and refining: (a) skills and knowledge learned in previous years, and (b) a specialization that is unique for each student.

The seven components of the program are integrated into the basic design of the total program. These components are: (a) Liberal Education, (b) Methods and Curriculum, (c) Child Development, (d) Teaching Theory and Practice, (e) Professional Sensitivity Training, (f) Social-Cultural Foundations, and (g) a Self-Directed Component. The staff developing the model composed of these components provided an excellent test for the workability of the pluralistic assumption about the nature of reality in teacher education. The components are diverse in nature and character. The full range of their diversity will be more apparent in subsequent chapters of this report which spell out each component more fully.

The specification of the behavioral elements which make up the teacher is carried on in the development of the seven components. Thus, the behavioral description of the teacher emerges as the components are developed. The intent-action-feedback paradigm serves to unify the work and to provide some model-like quality to the overall product. Nonetheless, the process results in a mass of behavioral elements which then have to be integrated rather than being elements which result by breaking down or task-analyzing an overall model.

As in the case of Michigan State, the Syracuse Model can provide, during development, for the creation of a more complete working conception of the teacher and this will greatly enhance the feasibility of the program.

Nearly all the models, as mentioned previously, employed behavioral performance analysis to affective as well as cognitive and skill domains and Syracuse included a large number of examples. The following is a statement of educational objectives for a module relating to affective behavior.

TTP-7: Educational Objectives for Affective Behavior

I. Prerequisites: Completion of TTP-5. Concurrent with tutorial experience in the public schools.

II. Placement of Module: Junior, pre-professional year.

III. Estimated Time: Student time - 4 hours. University faculty time - 0 hours. Clinical Professor and Clinical Teacher time - 0 hours.

IV. Operational Objectives: The purpose of this module is to develop the ability to discriminate between statements of educational objectives describing different levels of personal involvement, attitudes, motivations, values, etc., and to write objectives for lessons and curricula which include these types of outcomes. The general objectives of this module should prepare the student to do the following:

A. Recognize and discriminate between statements of educational goals describing the affective characteristics of children (as distinct from the other objectives already studied) as inferred from watching specific types of behaviors.

B. Write and justify the appropriateness of statements concerning the affective outcomes of lessons and curricula.

If these broad objectives are achieved, the student should, for example, be able to do the following:

A. When given a list of educational objectives, including the types of objectives studied in preceding modules and the different types and levels of affective behavior, be able to identify each and state the criteria for discriminating between them.

B. Given a case study description of an elementary classroom, including the characteristics of the pupils, be able to prepare a set of educational objectives for the class and individual pupils for at least three levels of affective involvement, such as:

1. Being willing to attend to the stimuli of the situation.
2. Responding when directed.
3. Consistency of self-initiated responses, at least within the limited regions of activity, etc.

C. Be able to relate a taxonomy of affective behavior to the various types and levels of attitudes, (towards self, others, objects, and activities), motivations (affiliation, achievement, power, avoidance of failure) interests, and values.

D. When asked to prepare a set of affective objectives for the child with whom he is working in a tutorial relationship, prepare objectives for at least one area of the child's activities, including at least three levels of pupil involvement. Justify the importance of these objectives for the child, school, and society.[1]

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[1] Syracuse University, Specifications for a Comprehensive Undergraduate and Inservice Teacher Education Program for Elementary Teachers (OE 58016) Washington D.C.: USOE, 1968. pp. 245-246.

This example shows not only a type of behavioral analyses in the affective domain, but the emphasis on reflective thinking by the teacher that characterized the intent-action-feedback paradigm. The behavioristic description of the teacher did not ordinarily imply a mechanistic-behaving teacher, but one with fluid, adaptable capability.

Syracuse also described the teacher as a member of a team, working with support teams and with a great variety of instructional systems and specialists available to him. This matrix is not fully described, but again we find the teacher in a very different role than in the average present-day elementary school.

Florida

The Florida State University conception of the teacher was arrived at in an attempt to break down the tasks of teaching into identifiable parts which could serve as the unifying goal of the program. (See Figure 3.6 on page 112).

The extent of rationalization of the Florida conception of the teacher was unusual--the development team clearly was making a serious effort to develop a model of a functioning teacher and relate the parts of that model to one another.

The long quote that follows describes their conception of the teacher and its justification:

> Five categories of teacher behaviors were identified as basic to all elementary teaching. They are stated here in their most abstract form. The first four are:
>
> 1. The teacher will plan for instruction by formulating objectives in terms of behavior which is observable and measurable.
>
> 2. The teacher will select and organize content appropriate to specified objectives in a manner consistent with both the logic of the content itself and the psychological demands of the learner.
>
> 3. The teacher will employ appropriate strategies for the attainment of desired behavioral objectives.
>
> 4. The teacher will evaluate learning outcomes on the basis of changes in behavior.
>
> These four behavior categories are integral parts of a regenerative or cybernetic conception of teaching in which both long range and immediate knowledge of results serves constantly to modify the direction and shape of the teaching act.

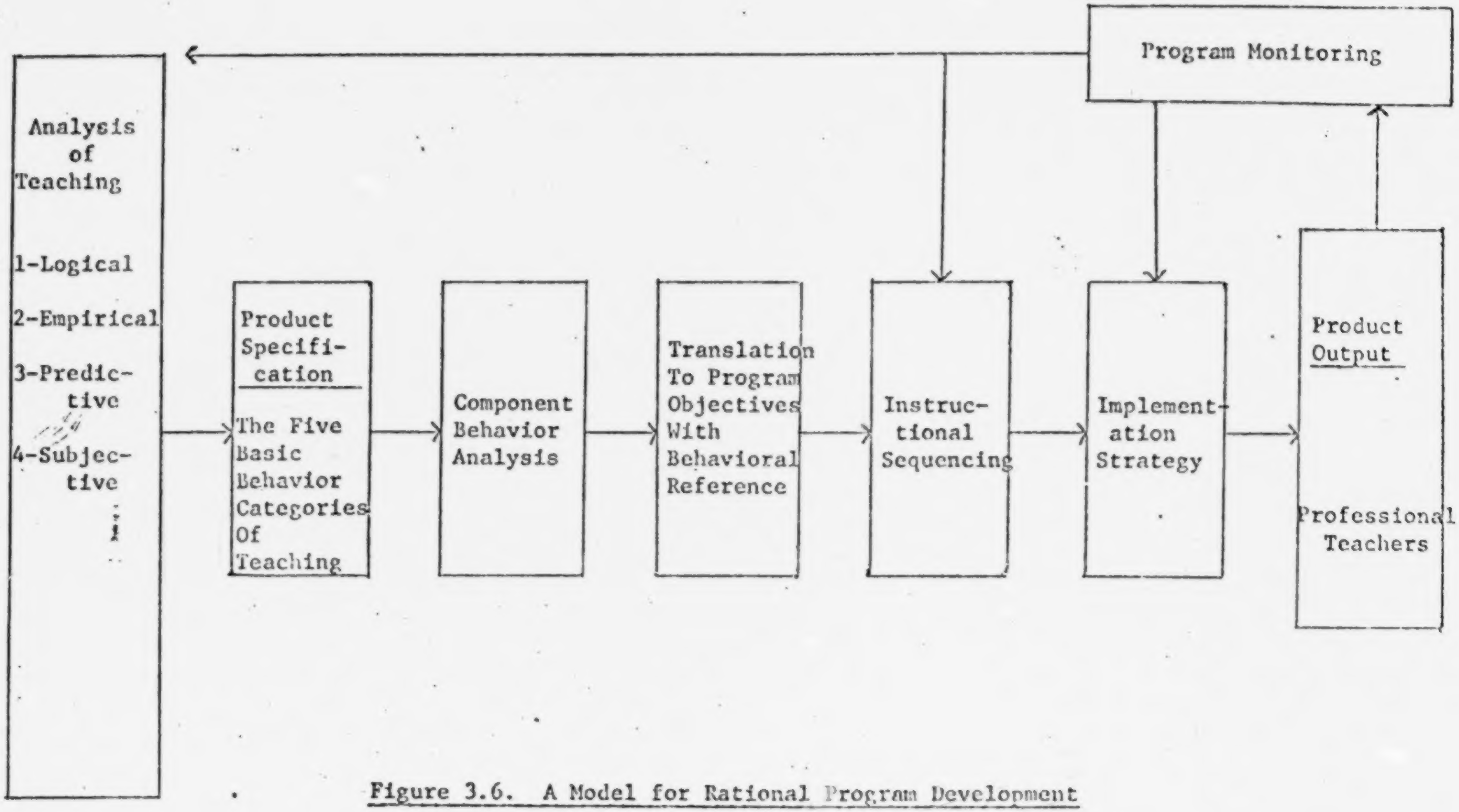
Program Monitoring
Analysis of Teaching
1-Logical
2-Empirical
3-Predictive
4-Subjective
Product Specification
The Five Basic Behavior Categories Of Teaching
Component Behavior Analysis
Translation To Program Objectives With Behavioral Reference
Instructional Sequencing
Implementation Strategy
Product Output
Professional Teachers

Figure 3.6. A Model for Rational Program Development

Florida State University, A Model for the Preparation of Elementary School Teachers (OE-58018) Washington D.C.: USOE, 1968, p. 36.

The fifth category of behaviors was of a somewhat different order:

5. The teacher will demonstrate an acceptance of leadership and professional responsibilities and demonstrate the ability to serve as a professional leader.

It takes little imagination to visualize all of these steps being followed by persons carrying out the teaching function, whether it is seen as that of an indirect facilitator of pupil learning activities, as the diagnoser of pupil needs and prescriber of pupil learning experiences, or as a direct transmitter of information to pupils via lecture. It seems likely that any approach to influencing the learning of others will demand competent performance in all five behavior categories.

While the chapters which follow contain detailed descriptions of the component breakdown of each of the five basic behavior categories, it is necessary at this point to explain the rationale for describing teaching in these terms.

It was decided that a regenerative model was the only realistic conceptualization which adequately provided for dealing with the infinite variability of learner responses. There is always the distinct possibility that the performance of highly precise and repetitive teacher behaviors will become a more important consideration than coping with learner response variability. In order to avoid this, all instances of verbal and non-verbal feedback must be recognized and interpreted by the teacher who is skilled at constantly modifying his own performance of teaching to maximally influence the learner.

Four behavior categories constitute broadly-conceived basic teaching tasks. In a very real sense, the formulating of objectives, the selection and organization of content, and the choice of appropriate strategies can be conceptualized as preactive tasks. That is, they are tasks which must normally be performed prior to any actual interaction with a learner, although under some circumstances, the execution of certain strategies may call for the involvement of learners in planning activity.

Planning for instruction is, of course, an essential prerequisite for all types of teaching. Although it is conceivable that instruction could proceed with objectives unstated, it is inconceivable that meaningful instruction could long proceed without a purpose. Following systems approach requirements demand that purposes (in the case of teaching, instructional objectives) be explicit and specific, with the assumption that only in this way can decision, execution, monitoring, and regeneration be accomplished with precision. For this reason, the statement of instructional objectives in terms as precise and behavioral as possible was a process utilized both in model program development, and in describing the basic tasks of teaching.

It must be acknowledged that a strong case can be made for the inclusion of other types of objectives, such as those which call for no more than exposure of a learner to natural elements within the environment, without specification of explicit expected outcome. Such ideas will ultimately receive attention in training, particularly during in-service years. However, for pre-service training, the use of a behavioral model holds the strongest promise as an organizing concept since it expedites acquisition of the knowledge and skill needed for initial entry into teaching.

The statement of objectives in behavioral terms facilitates elements of other basic tasks, such as the systematic selection of content for learning. A teacher who has learned to apply principles of selection will carefully diagnose learner characteristics and will consider the logic of specific content. He can apply these principles in such a way that learner interaction with that content will be enhanced. Teachers have traditionally played a significant role in structuring content for particular learners. The teacher of the future is likely to play a somewhat different role with respect to the selection and organization of content. A trend toward use of multi-media, including pre-packaged programs for individual learners, suggests a teacher role which is less that of a developer of instructional programs, and more that of an assessor and adaptor of pre-packaged programs. Either role demands that selection and organization skills be highly developed, and that considerable practice in examining, selecting, and utilizing a wide range of available content material be provided.

At some point, the teacher must decide on a strategy for arranging and controlling the conditions of the contact of learner with content, and then implement whatever strategic interaction he has selected. The model program treats factors underlying both the pre-active behaviors needed for strategy selection and the interactive behaviors involved in strategy implementation under the single behavior category of "strategy."

Strategy selection requires the teacher to make decisions about what kind of learning is involved, what environmental arrangements are most likely to promote the most productive involvement of a given learner with selected content. These pre-active decisions must be made if teaching is to be performed scientifically rather than haphazardly. Thus, the model program provides specifications for a sound theoretical decision base and for practice at reaching such decisions.

The ability to execute strategies, once selected, is a major goal of the model program and is considered a key to the successful performance of all types of teaching. Teachers must be able to arrange two basic kinds of strategic interactions: (1) non-personal interactions, and (2) interpersonal interactions, including both content-oriented and functional interactions.

Non-personal interactions require the teacher to arrange the physical invironment so that the content is mediated through some non-personal means, such as the surroundings (as in a field trip), or some item on the media list, such as books, still and moving pictures, charts, audio equipment, laboratory models, and materials. Recent research activities give promise of providing useful guidelines which will assist the teacher in selecting and structuring student involvement with the non-personal medium most appropriate for a given learning situation (Briggs, 1967).

Interpersonal interactions of the content-oriented type refer to those in which the learner interacts with another person (usually the teacher) in a situation where the focus of the interaction is the content selected to further some instructional objective. Under this heading go behaviors often classified as instructional techniques or the "technical skills of teaching" (Stanford Center, 1967). These behaviors involve the execution of particular verbal and nonverbal tactics designed to evoke particular responses from students, to provide or secure feedback which can be immediately processed by teacher or students, or some similar purpose.

A second type of interpersonal interaction, which for these purposes is termed "functional interaction," refers to those interactions which are not primarily tied to the content selected for some instructional objective. Under this heading are found techniques for assessing and improving the physical conditions of the learning environment and for setting a psychological climate conducive to learning. Because reinforcement techniques have been proven crucial to the modification of behavior (Spaulding, 1964; Becker, 1967), and because the reinforcement concept is generally unrelated to the specific content of instruction, reinforcement skills are treated independently from other strategies and included under the functional interaction category.

To the same extent that a teacher performs certain tasks pre-actively and interactively as he seeks to influence learning systematically, he must also consider post-actively the results of his efforts. A conceptualization of evaluation which includes a formative (regenerative) function is fully compatible with the classic summative function which furnishes information in the form of grades and ranking. Teachers must evaluate the outcomes of instruction for the purpose of modifying the course of instruction, as well as to provide information relative to learner status and progress (Wilhelm, 1967). The instructional objective, considered first as the sine qua non of planning, serves also as the basis for evaluation since it has been precisely stated in terms which facilitate observation and measurement. A wide range of skills must be acquired in order to evaluate the outcomes of instruction for the full range of purposes.

The fifth major dimension of teacher behavior, involving professional responsibilities and leadership, cuts across all other tasks and adds to the performance of teaching that quality which sets it apart from more inert activities. The component behaviors of this fifth behavior dimension receive somewhat less emphasis during the pre-service phase than in the in-service phase of training because of the more urgent priority of instructional and management skills and because of a readiness factor which cannot be assumed until there is input from experiences gained while carrying out full teaching responsibility.

In this category are skills related to handling of one's emotional behavior and development of a personal

> teaching style; skills in handling inter-personal relationships with colleagues within the profession and with persons and agencies outside of the profession; and with skill in interpreting, assessing, and applying results of educational research. All three of these areas are intimately interrelated and are necessary for a teacher who is to be an agent of change, and who will be able to adapt to changing conditions.[1]

Working from this unifying conception of the teacher the Florida team was in a position to make a task analysis of each of its component elements and maintain program unity and be sure that developed elements would fit closely into their model of the teacher.

This feature of the Florida program should be maintained and extended during development. Also, the conception of the teacher is flexible and provides for the incorporation of contemporary educational knowledge and skills - which is important for the actual elements which were developed by the Florida team were far less innovative than their conception of how to build a future-related program.

Summary

Figure 3.7 (see page 118) provides a rough comparison of the prominent features of each conception of the teacher. *All* conceptions shared the following features:

1. The teacher was not only described in behavioral terms, but was seen as a behaviorist; a setter of behavioral objectives, user of behaviorally-oriented teaching strategies, and user of behavioral measurement techniques. *There were no exceptions to this*.

2. The teacher was seen as a member of a clinical team, rather than as a lone operator in a self-contained classroom. Specialists were envisioned in most cases.

3. The teacher was seen in most cases as working in an environment rich in support systems, especially self-instructional materials. Thus, he functions as a diagnoser and orchestrator rather than as the typical teacher of today.

Shared Conceptions of the Teacher

1. Behaviorist
2. Team Member
3. Diagnoser and Orchestrator

---

[1] Florida State University, *Ibid.*, pp. 35-41.

Figure 3.7. Essential Features of Conceptions of the Teacher

Pittsburgh	ComField	Georgia	Toledo
Individualizer. Orchestrator of self-instructional	Teacher who can produce learning.	Teacher who facilitates ideal pupil behaviors.	Team member (a corporate conception).
	Orchestrator and facilitator of wide range of materials and strategies.	Team member (hierarchical teams).	Uses behavioral techniques to function within support systems and work with large range of goals.

Michigan State	Massachusetts	Syracuse	Florida
Clinical Style--Applied Behavioral Scientist	Human Relations--Content-Behavioral Skills Conception	Intent-Action-Feedback Paradigm	Behaviorist--Hypothesis-tester
Hypothesis-tester using behavioral techniques	Behaviorist. Team member and specialist	Behaviorist and Team member	Team member and orchestrator of materials

Both the activities and the performance criteria of all the models manifest a concern with an emerging future. The documents so frequently refer to the inadequacy of our present knowledge about how to educate children that you might suppose that the teams were obsessed with feelings of ignorance as they prepared the models. There was a determination to develop a teacher who would join in the battle against ignorance. He would act as a hypothesis-tester, as one who would propose objectives for students, who would define the conditions likely to achieve those objectives, who would bring about those conditions and evaluate the outcome, and then would set to work again on the basis of what he observed. Although the styles of specification varied greatly, the teacher was seen in all cases as a member of a clinical team which would use the tools of the behavioral sciences to clarify objectives and to generate theses about the kinds of conditions that would achieve them. As an evaluator, also, he was seen as a behaviorist, using the techniques of social science to attempt to determine the results of his efforts.

In the affective and human relations domains also the behavioral sciences were very prominent. The teacher was seen as relating to other professionals, and it was assumed that it would be possible for him to receive the clinical training that would help him relate to others productively and that he would use knowledge from the behavioral sciences to guide his work with peers and community members as well as his students.

The teacher, then, was conceived as an applied scientist who would help create his field as well as practice on the basis of its present knowledge.

Implications for Teacher Education: Commonality and Variability in Models of Teachers

The developed performance models reflect an implicit consensus about the most productive roles for the teacher today:

a. As an applied scientist (one who helps find the answers) and a behaviorist.

b. As a team member (a colleague and a specialist).

c. As a decision-maker and clinician (a strategist with a range of competencies).

d. As a change agent (and one whose personality can cope with change).

e. As a manager of instruction, orchestrating vast amounts of instructional material and support systems.

f. As a behaviorist--a "systems" man in his own right, setting behavioral objectives, breaking down learning tasks into their elements, and selecting learning activities and evaluation devices tailored to a range of students and differing kinds of learning.

In other words, no one developed a fixed performance model of the teacher - he was seen as one emerging and growing with the times and his own development. All saw behavioristic modes of planning and training as compatible with humanistic, affective goals, and with training to function in the humane domains. In fact, all saw behaviorism as the best avenue to a more humanistic as well as a more efficient education for children and teachers alike.

Hence, all of these systems planning teams denied the familiar assertion that systems planning techniques and humanistic education are incompatible.

The wide range of approaches to the development of the performance models included:

a. conceptions of individualized and personalized education (several models, with Pittsburgh giving this conception a major focus).

b. conceptions of teachers as people who make educational decisions, implement them, and get results. (ComField is most direct with this conception, but it is shared by all models to some extent, and the "clinical style" from the Michigan State Model focuses an enormous array of modules.)

c. conceptions of teachers as changers of educational institutions. (Especially heavy emphasis by Syracuse and Massachusetts, with Teachers College giving its entire conception to an innovator, and Florida and ComField providing linkages to schools through schools especially committed to innovation.

d. conceptions of interpersonal and affective behavior (Syracuse and Massachusetts were most explicit here).

This wide range (which appears wider the closer the examination) belies the notion that systems planners tend to produce homogeneous conceptions of goals and means. The products represent an especially wide range of alternative goals that can be used by second-generation planners to make available, within training programs, different conceptions of education and teacher education. A second-generation effort in this field can capitalize on the diversity represented here and a map of alternative performance models should gradually emerge.

On the other hand, the conceptions were greatly lacking as working models of the teacher. Rather than developing an overarching conception which was then broken down into behavioral elements, most of the teams used very general theses about the teacher and working teams did most of the work of developing behavioral descriptions. Thus the majority of the actual behavioral description of the teacher resides in masses of behavioral objectives.

We consider it vital that more complete and functioning working models of the teacher be created as the programs are developed and implemented. As much as is possible, the performance models need to be:

1. Dynamic models which can unify vast, complex programs and give clear guidance to developers. (The Pittsburgh Model is very strong here.)

2. Rationalized conceptualizations which relate the components of teaching to one another and, thus, lead naturally to related program components. (Florida State's conception is heuristic.)

3. Clearly related to the systems which surround the teacher--material, other personnel, support systems, and decision-making systems. (The ComField Model is heuristic in this regard.)

4. Provide some guidance for the task analysts who will break down the major elements of teaching behavior into a clarified system of objectives. (Toledo provides a useful example here. Its description of the teacher provides clues for analyzing and sequencing behaviors. Georgia does also, but to a lesser extent.)

In addition, development needs to ensure that a much wider range of theories about teaching enter the models which tend at present to emphasize very direct, presentational methods of teaching. Many other strategies are alluded to and there is room for them in the form of the programs, but the conception of the teacher needs to make much wider and more imaginative use of a vastly broader range of teaching behaviors than has so far been the case.

All of the programs use a modular curriculum organization; the training of the teacher is organized in sets of units each containing specific objectives, alternative activities, and evaluation procedures. To this extent they employ a common strategy, one which cannot be implemented for a large number of students unless it is accompanied by contemporary management technology to relate the modular units to students and provide feedback about the progress of individuals and the successful and unsuccessful elements of the program. Within the common modular approach there is room for many strategies of learning and a wide range of content. A series of analyses were made of the program strategies and these are reported in this chapter in the following order:

1. A classification of program components by content.

2. An analysis of ways of increasing program unity and decreasing fragmentation within modular structures.

3. A discussion of the use of cybernetic psychology and simulation in systems approaches.

4. An identification of promising practice for personalizing the education of the teacher in managed, modular curricula.

5. An identification of strategies for improving several of the models on their own terms.

A Classification of Program Components by Content

We will begin by comparing the programs in terms of the gross content and strategies components that make them up. Because an important consideration in implementing the programs is the extent to which their components differ from the components ordinarily used in teacher education programs, Table 4.1 (see pages 125-126) is constructed to permit a comparison of the content of the model components with those typical of teacher education programs in recent years. The chart also includes an estimate of the distinctive approach of each program.

Georgia was selected as representative of the programs of relatively homogeneous modular structure, which include Toledo and Florida State. Michigan State was selected because it deals in great detail with a comprehensive four-year liberal arts/professional training program. Syracuse and Massachusetts represent less homogeneous training programs which also characterize ComField and Wisconsin.

To make the chart, the components of the approach described by Lindsey and Stratemeyer[1] as the recommended or prevailing program of recent years were identified. Then, Michigan State components were identified. Those the same as the traditional ones were identified as such and those that differed were added to the list. The other programs were treated in a like manner, resulting in a list of all components arranged so that it was clear which components appeared in one or more of the programs.

In addition, the general approach of each component (its teaching strategy) was noted. For example, the Syracuse "philosophy" component employs "seminars and readings" as its strategy. The "behavioral" component from the Massachusetts model uses "micro-teaching and feedback."

In addition, several general strategies were employed to a great extent in several of the programs. One we characterized as a "modular, performance-oriented approach with self-pacing by the student." Where this strategy was used, a check mark (✓) appears. In addition, if the student is given options that "personalize" instruction as well as pace it, the check is crossed (✗). Thus, in the Massachusetts model, the "science" component is modular, personalized, and uses a strategy of laboratory workshops and courses.

Looking over the chart, it appears that most of the new programs included the components of the Lindsey-Stratemeyer approach, but included some others as well. A few of the "traditional" components missing in the present models will no doubt appear as the development phase continues. Presently Georgia includes physical education but the others don't. Almost certainly, however, the others will decide to provide physical education, as development takes place.

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[1] A. Margaret Lindsey and Florence B. Stratemeyer, Working with Student Teachers, New York: Bureau of Publications, Teachers College, Columbia University, 1958.

The programs have distinctive characteristics that color all their components. For example, the Michigan State program is held together by its massive storage and management system. This system makes all program elements visible to all faculty and students and permits various program changes to be made easily. As some of the other models are further developed they will use similar systems. Syracuse is characterized by the intent-action-feedback paradigm (described in Chapter Three), which provides students and faculty with continuous knowledge about the appropriateness of actions and outcomes to intentions. Various permutations of micro-teaching anchor the Massachusetts approach which also has big helpings of human relations training throughout. Georgia is characterized by its steadfastly modular approach and behavior-modification training techniques.

The great similarity of program content to traditional programs should make implementation easy on one count, since the programs bring relatively little new content to teacher education. On the other hand, it is odd that a larger variety of components did not arise from the effort to create new teacher education programs.

Odd, that is, unless one considers that in most cases the projects to create the models were organized in teams according to the traditional component areas. As pointed out in Chapter Three, most of the model-builders did not construct a general model of the teacher and then break it down into component elements. Rather, a general idea of the teacher was created as a guideline to the development teams (as the Clinical Style of the Michigan State approach) and then teams, already organized according to major areas of development, proceeded to work constructing the behavioral elements (objectives) of the program and the activities which would be related to them. Thus the organization of the projects predetermined that most program components would be traditional. Only when a development team was organized to include new areas (as Massachusetts with "behavioral" and "human relations" components) could they arise.

However, the program strategies uniformly included a modular organization. This is the major departure from the traditional procedures and permits an individualization and personalization not remotely possible in the seminar/course/practice-teaching structures of the traditional programs. Also, conceiving the teacher as a behaviorist (see Chapter Three) greatly influenced specific program content.

Against Fragmentation: A General Feasibility Problem

In large modular program structures a persistent problem is to establish relationships among modules so that the environment which is presented to the student has an integrated and coherent character.

Soltis suggested that the program models could be classified as:

1. "Atomic," in which modules as presently specified appear to be almost completely independent of each other except for

Table 4.1. Program Models by Content of Component, Characteristic Approach, and Comparison with Typical Teacher Education Programs.

Component	Typical Program	Michigan	Syracuse	Massachusetts	Georgia
(Characteristic Approach)		(Clinical Style)	(Intent-Action-Feedback)	(Micro-Teaching, Human Rel. Train.)	(Job Analysis, Elementary school goals)
Human Relations		✓	✓Semi-programmed texts, Feedback tape analysis	✓Interview, Analysis, Self-awareness training	
Behavioral		✓	✓Seminar, Problem packet seminar	✓Micro-Teaching & Feedback	✓Specified in all components (affective)
Aesthetics	Courses, Observation, Development of units	✓Workshop, Readings, Writing, Discussion to compare aspects of issues		✓Demonstrations, Personal exploration	✓Lab
Language Arts	"	✓ "	✓Modular instr., Self-instr. from programmed mat'l	✓Micro-teaching, Classrooms-learning center	✓Lab
Social Studies	"	✓Real & simulated sit'ns employing decision-making modes of social scientists	✓ "	✓Use of model from Social Science	✓Lab
Science	"	✓History of man's view of world-patterns of science	✓ "	✓ Lab, Workshops, Courses	✓Lab

Mathematics	"	✓ "	✓ "	✓Programmed texts, Lectures, Videotape, Discussion groups	✓Lab
Foreign Languages				✓Programmed text, Language house, Radio & TV, Travel	✓Lab
Pre-School		To be developed		✓Self-awareness encounters, Clinic, Children's home	Lab
Evaluation	Course work in lab, Observation	✓Assessment, feed-back, Built-in checkpoints	✓Seminar, Problem packet seminar		Specified in all components
Media		Graduate level ✓			✓
Supervision				✓Simulation, Videotaping, Micro-teaching, Programmed instruction	
Child Development (Human growth & Development)	Course work, Lab experience, Observations	✓Environmental systems of pupils explored, Study of school as social institution	✓Seminar, Analysis of videotapes		✓
Philosophy			✓Seminars, Readings		✓
Health and Physical Education					✓

Table 4.1. Continued

Component	Typical Program	Michigan	Syracuse	Massachusetts	Georgia
Laboratory Units (Clinical experiences, Student teaching, Internship, etc.)	Student Teaching (Fulltime for 1/4 of school year	✓Tutorial, Seminar, Team-teaching, and Internship (1 yr.)	✓Choice and use of Instructional materials, part-time student teaching senior year, Activity in teaching centers	Internship until competence	✓Internship
Additional elements		3 main components Liberal education, Prof. use of knowledge, & Scholarly modes of knowledge		Alternative routes always provided	

their common membership in a management system.

2. "Molecular," in which there are some connections or systems for integration, but the integrated clusters are not connected with one another.

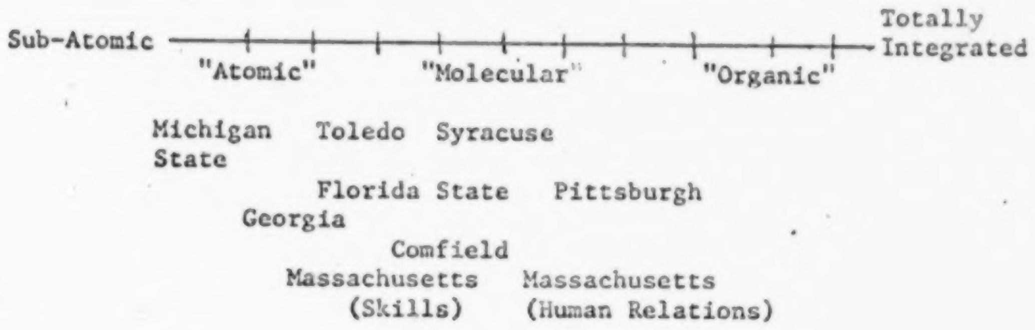
3. "Organic," in which they are explicitly related and seen in terms of interrelated functioning in the individual.

In our view the organic level is most desirable and increases the feasibility of a model from the point of view of all parties.

It cannot be achieved without an integrated, working, "performance" model of the teacher. As indicated in Chapter One, only Pittsburgh of the eight models which we analyzed remotely approached a working model, and that was achieved with a narrow, specific view of the teacher (not a criticism!) which many might not accept or, if they did, might feel should be complemented by other types of teachers.

Thus, most of the models would have to change their conceptions of the teacher in order to be able to organize their program organically. The remainder of the programs we classify as follows:

Figure 4.1. Programs Classified by Integration of Modular Elements

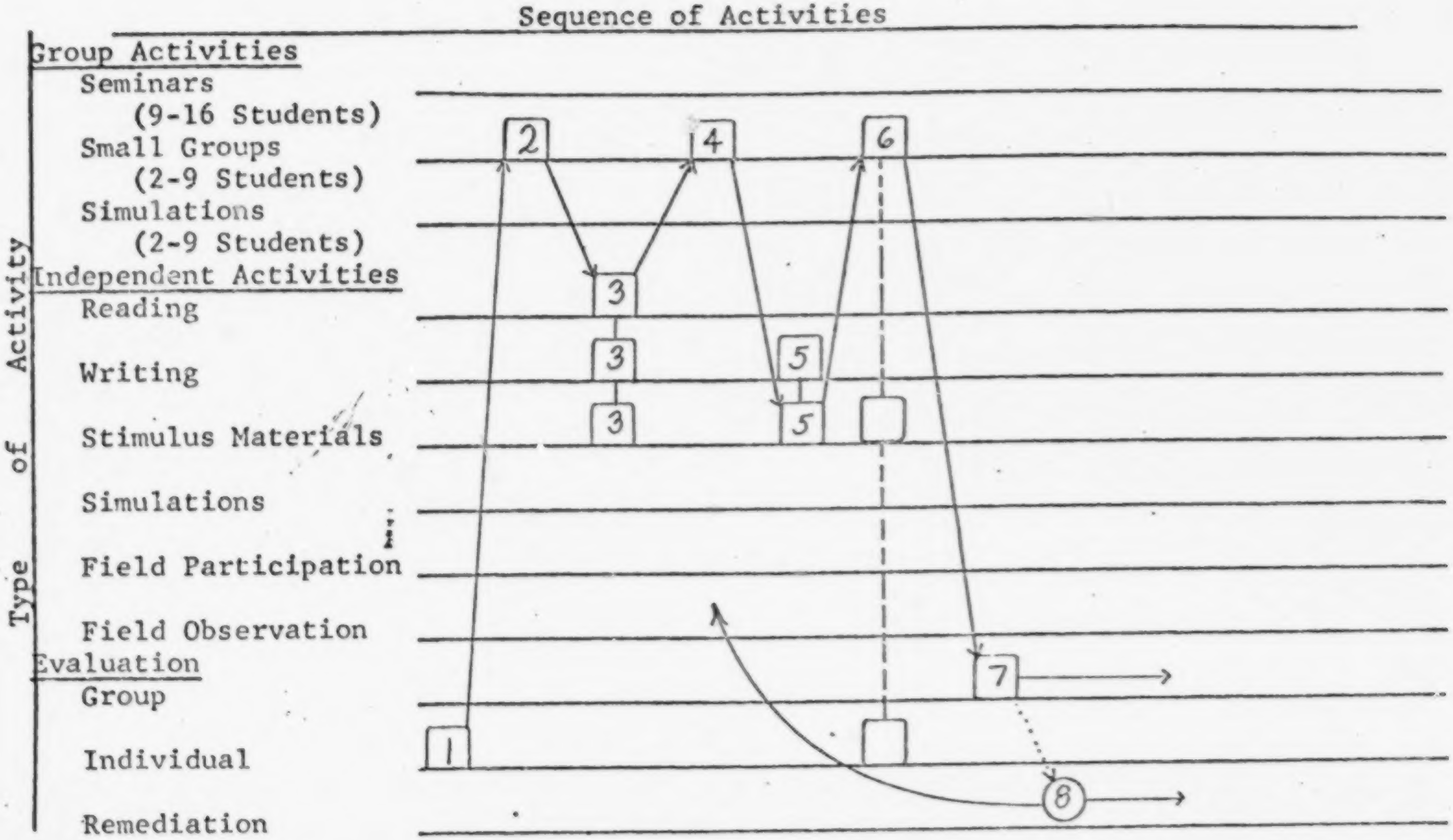


Integration of elements can be achieved in several ways by designing types of linkages which can be used, during development, to specify interrelationships among program elements.

The Syracuse Model had several devices which could greatly enhance the integrated nature of several of the other programs. This was especially true of Michigan State, which with its useful storage system, could advance its entire structure to the molecular and perhaps the organic stage, simply by employing this device, if the linkages were related in turn to the "clinical style."

The Modular Flow Chart of the Syracuse Model (Figure 4.2, see page 129) illustrates their system for relating clusters of activities pointing to an objective or group of objectives. It serves, during development, as a system which reminds the developer of the range of activities available to him and helps him relate a variety of modes of instruction to each other to develop a particular competency or group

Figure 4.2. Modular Flow Chart TTP-16


Sequence of Activities
Type of Activity
Group Activities
Seminars
(9-16 Students)
Small Groups
(2-9 Students)
Simulations
(2-9 Students)
Independent Activities
Reading
Writing
Stimulus Materials
Simulations
Field Participation
Field Observation
Evaluation
Group
Individual
Remediation
1
2
3
3
3
4
5
5
6
7
8

Syracuse University, Specifications for a Comprehensive Undergraduate and Inservice Teacher Education Program for Elementary Teachers (OE-58016) Washington D.C.: USOE, 1968, p. 282.

of related competencies.

Such devices could relate activities pertaining not only to one domain of development but to several. For example, in the Massachusetts Model, sequences of activities within the behavioral, human relations, and content areas could be related to each other through an augmented system such as was used by Syracuse.

In a sense, what this type of device does is ensure that the concept of module includes only meaningful units of activities so that the student is not thrown into a mass of activities over objectives too small to be functionally meaningful.

There are several other ways in which well-developed elements of some models can be employed to enhance the structure of other models.

Simulation and Cybernetic Psychology

Most of the models provide explicitly or implicitly for considerable use of simulation in training activities. ComField is especially thorough in the integration of a teaching laboratory throughout the program and represents the most elaborate description of the use of simulation throught teacher education to date, although much specification remains to be done.

The rationale for the use of simulation is that "situations less complex than the reality of the classroom" permit the teacher to master skills which are very difficult to learn in the taxing chaos of the classroom and, derivatively, help him prepare for that complexity by achieving competency before taking responsibility for the education of children.

Simulation, despite its limited use to date in teacher education, has been used with considerable effectiveness in the training of such complex personnel as airline pilots and high-level military tacticians. There is little doubt of its potential in the training of teachers.

In all previously successful uses of simulation the basis of the simulation system has been a cybernetic model of the functionary (broadly defined) who is to result. This does not mean that the description of the functionary has to be in terms of a rigid administrator of pre-set procedures. On the contrary, one of the most interesting potentials of simulation is for the training of problem-solvers. In fact, there has already been at least one experimental use of simulation in teacher training in which the goal was to increase the flexibility with which the teacher would perceive the learner and modulate his behavior during interactive teaching.[1] However, it is very difficult to plan for the extensive use of simulation unless there is an effectively functioning model of the performer who is to emerge. Development of the simulation experiences specified in the program models will have to be accompanied by the creation of more complete and unified working models of the teacher (as indicated throughout Chapter Three). A little elaboration will illustrate the point. As specified in the present versions of the model, simulation can function to:

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[1] Bruce R. Joyce, Peter Dirr, and David E. Hunt, "Sensitivity Training for Teachers: An Experiment." The Journal of Teacher Education, Vol. XX, No. 1 (Spring, 1969), pp. 75-83.

A. Introduce new areas of development. (The realistic, controlled confrontation of simulation helps the trainee become aware of the need to learn and clear about how the new learning will relate to his performance as a teacher.)

B. Provide for the operationalization of learnings in the form of teaching performance. (Learnings from other modes become integrated in performance.)

C. Provide for the integration of several domains of learning. (Simulation can present opportunity for the successive incorporation of new skills and other learnings into operational performance.)

D. Provide for a gradual increase in complexity so that the developing teacher can deepen and extend his skill.

E. Personalize the development of the clinical style. (ComField has significantly grasped the possibilities of simulations which leave much room for personal style while requiring precision of performance and accountability for results.)

If we consider only "C," the integration of learnings from several modes and domains, and "D," the staging of complexity, it is apparent that neither of these can be achieved without a cybernetic conception which relates growth in several domains and conceptualizes the possible stages of complexity.

Personalization of Learning

Aside from the considerable power which modular curriculum structures have for facilitating the individual pacing of learning through pre-set sequences of activities, a feature which is shared by all the program models to a considerable degree, to what extent do they personalize the education of the teacher, helping him develop his uniqueness and actualize a personal style of teaching?

The chart on page 132 gives our estimate of the relative power of each of the program models to personalize the teacher's education.

Pittsburgh, Syracuse, and ComField each employed devices which could be emplyed to increase the personalization of the other models.

Figure 4.3. Extent of Potential Personalization of the Models for Elementary Teacher Education

← Maximizes Personalization   Minimizes Personalization →

Pittsburgh
Syracuse
ComField
Michigan State
Florida State
Toledo
Massachusetts
Georgia

Pittsburgh arranged a faculty-student relationship which provides for regular program-planning for each student with continual re-setting of goals and development of means suited to the personal style of the teacher-candidate. While the mechanics of this are not by any means fully worked out, it seems feasible to develop a counseling system which could provide, in any model, for counseling relationships within which faculty could modify experiences to suit the candidate or help the candidate plan and carry out individual learning activities within the resources of the program.

Syracuse employed two primary devices. One was the general conception of the teacher as a problem-resolver, a person who would use general professional knowledge and skills to solve problems but who would have the personal capacity to generate ways of approaching problems. Thus individualized and personalized experiences alternate through the program.[1]

Second, Syracuse provides for a "self-directed component" which they describe as follows:

> Self-Directed Component. This component is intended to foster independent, self-directed activity oriented ultimately toward professional ends. It has considerably less structure than the preceding components particularly with respect to the subject matter which will make up the component. It does have the structure provided by specific goals and the supporting instructional situations which characterize the component. The essential task for the student in this component is to (a) determine what changes he would like to see take place in the children he teaches, (b) describe these changes behaviorally, (c) determine what specialized training is needed (in addition to that provided in other components of the model program) to help him in the accomplishment of these goals, and (d) to accomplish such ends as he has specified with the pupils he teachers during his resident year.

The component provides a firm helping relationship in the performance of this complex task. The student selects a counseling-advisor with whom he works on a regular basis. This relationship between student and counselor-advisor is an enabling relationship combining the talents of the counselor with the talents of a generalist in the field of elementary education. In addition to this one-to-one relationship with a counselor-advisor, the student may participate in one of the student-controlled enabling seminars of about twelve students each. These activities are to be supplemented by a student-controlled weekly newsletter for expressing ideas and concerns about the profession and the program.

The student develops a "planning and goals" paper around which his self-directed activities evolve. He is ultimately expected to realize these plans and goals through his own independent activities. The goals toward which this component work are the goals of professional independence which will enhance the dignity, integrity, and autonomy of the student as a teacher, help him take responsibility for his own learning, and help him to independently modify his own ideas, values, and behavior. From this self-directed activity would come (a) continued increased understanding of the unique qualities of self as a teacher, (b) the development and implementation of a personalized set of educative experiences culminating in a professional specialization that transcends the general training gained in the basic program.[1]

ComField makes effective use of a teaching laboratory which utilizes many simulated teaching tasks and encourages the development of a personal teaching style as well as the mastery of prescribed professional knowledge and skills. The simulation laboratory has considerable potential in this direction.

Individual Program Strategies

The programs are so massive that to characterize each of them adequately in a report of reasonable length and clear enough structure is out of the question unless one severly limits the perspective he uses. The perspective we have chosen attempts to identify the uniqueness of each model approach and to ask the question: "How can this model be improved so that its unique strength is enhanced?"

This question appeared to us to be of vital importance to the developers of the models, since the basic question for the developer and implementer of a model is, "Aside from the systems approach, with the emphasis on performance goals, a modular curriculum structure, and management oriented toward individualization and quality control, features shared by all the programs, what is the unique strength of each model and how can that quality be capitalized on?"

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[1] Syracuse University, Ibid., p. 25.

Hence, in this section we attempt to identify the most prominent and potentially unifying element of each program model and recommend procedures which are likely to increase the feasibility of the model by capitalizing on its essential strength. Many of the recommendations for each model are borrowings from other models.

Taking the Models on Their Own Terms

To make a fetish of internal consistency is an ugly form of pedantry. If we avoid fetish, however, there are some striking advantages to educational programs that have a high degree of internal consistency, for reasons that are much more than the brandishing of theoretical elegance. An educational program that stands for something both in terms of mission and means can have a unified power and clarity which greatly increases its value.

In this section, we attempt to characterize the essential "model for the model" of each of the projects and discuss the extent to which the program which is specified accords with that model and what would need to be done to bring the program more fully in line with what seems to be the fundamental conceptions that give it its greatest strength. For those who would further develop and implement these models we feel that this may be the most valuable enterprise that they can engage in. All of the other criteria by which we look at the feasibility of the models and most of the criteria by which the themselves looked at feasibility during their Phase Two activity are external to the structure of the individual models. There is validity in the use of these external criteria and nearly each one of the models can benefit by applying them during the feasibility-making stages, but to give a program maximum strength and integrity it should be developed so that the "model of its own model" has full expression in the program that finally comes into existence.

Florida State University

The Florida Model is philsophically built on a concern for a teacher of ten years from now.

The rationale for this model program is based upon:

1. predictions of what society and education will be like by 1978;
2. inferences about the nature of teaching and the role of the elementary school teacher by 1978; and
3. implications for the preparation of elementary school teachers.[1]

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[1] Florida State University, A Model for the Preparation of Elementary School Teachers (OE-58018) Washington D.C.: USOE, 1968. p. 3.

They thus begin with a rather sound idea that if we plan a teacher education program today, its graduates will be at about the five-year point in experience about ten years from now, and, at a minimum we need to plan so that their preparation will be suitable for the world in which they then find themselves. Florida spent considerable effort in speculating about the future and the kind of person who would be able to operate effectively in the schools of the future. We feel that this is the essence of their model--an attempt to use systems planning to forecast the future and that systems procedures to develop training modes which would be appropriate for the future.

There are certain ways in which Florida fulfills its intricate model very well. One of these ways is by using a variety of modes of instruction, thus ensuring that the teacher in his own training will encounter many technologies and experience many strategies for learning and teaching, thus learning at first hand how they can be orchestrated in a fully contemporary way (see Figure 4.4, page 136). Since all of these modes emphasize self-paced experiences and criterion-referenced performance evaluation and all the activities are monitored by a computerized management control system with feedback capability, there is a definite future orientation to the texture of the Florida Model.

However, when we look at the substance of the modules themselves, to the kinds of teaching skills which will be taught and the kinds of knowledge which will be taught to the teacher, the picture is not so future oriented. It is, in fact, not very different from what has been the content of teacher training programs for at least the last forty years, with some updating of content. The conception of the teacher, in other words, does not seem to be as future oriented as does the conception of the need to prepare him in such a way that he will have a future orientation. Furthermore, there is very little provision for the development of reflective or creative thinking in the Florida Model. A teacher who would be comfortable in the fast-emerging future society which is depicted in the early sections of the Florida document would surely need to be philosophically prepared to reflect on what was happening to him, to gain some historical and philosophical perspective on the events that surrounded him. Further, he should be prepared to help others behave rationally while living in the midst of such rapid and unpredictable change.

We believe the Florida Model would take on greater strength if, as it is redeveloped for implementation, the view of the teacher is reconceptualized in a more forward-looking way. That conceptualization should, in our opinion, conceive of him as a philosophical person using his technology and building on it a new technology, but with the reflective- and creative-thinking capability to master the changing futuristic environment in which Florida believes he will find himself.

The ComField Model

The essence of the ComField Model lies in the conception of the teacher as an instructional manager who is able to bring about learning in children. In its program methodology we can see the desire to help

Individual Activities

Cmp	Computer Interaction
Int	Interview and Consultation
IS	Independent Study
LAV	Laboratory and Audio-Visual
Wr	Writing

Group Activities

Dsc	Discussion Group
Lct	Lecture
Prj	Project
Prs	Presentation

Field Observation

Ocl	Observation in Class
OO	Observation in Other Site

Simulation

SmO	Observing Simulated Situations
SmP	Producing Simulation

Teaching

Tcl	Classroom
Tsg	Small Group
Tt	Tutorial (one student)

Figure 4.4. Experience Codes

The Florida State University, A Model for the Preparation of Elementary School Teachers,(OE-58018) Washington D.C.: USOE, 1968, p. 55.

the teacher develop a personalized style for managing instruction and for providing the management-support service necessary to instruction. The use of the laboratory for training is very much in line with their view of a teacher and how he should be trained, for it provides many opportunities to develop both a personal style and technical proficiency. In other words, the use of the laboratory provides the setting in which the teacher can be trained and evaluated in a way consonant with their image of the teacher.

However, there are several unresolved questions within the ComField structure which, if they were resolved, would greatly increase the potential power of the model. First, they stress throughout that the teacher candidate will be able to negotiate many of the activities that he will pursue as he tries to prepare himself, yet the objectives of the teacher education program are derived from the specification of the kinds of objectives that might be set for elementary school students and the kinds of conditions that would be likely to achieve those objectives. The teacher presumably will be trained to produce those conditions and to evaluate the outcomes. This means that many of the objectives and activities will be specified for the teacher. It is not explained how a system external to the teacher candidate would be reconciled with the intent to have the teacher largely determine the nature and course of his own experiences. There is recognition within the report that some objectives are required of all teachers and some simply of those who are going to be specialists or work with specific kinds of children, but this acknowledgement does not resolve the basic question, which is how within a systems design, does one allow for student negotiation. There are a number of potential solutions to this problem. The ComField Model developers might look at the kinds of devices generated at Syracuse to approach a similar problem. For example, in the final report on the ComField Model, we find the definition of teaching style as well as the specifications for the personalization of the process of teacher education:

> Teaching Style
>
> As used in ComField, the concept of teaching style refers to the matter of integrating and synthesizing the various professional competencies develop through ComField into a unique and personally relevant approach to teaching. It is hypothesized that two factors are necessary to bring this about: (1) a knowledge of alternative styles, and (2) an opportunity to practice alternative styles.
>
> Specifications
>
> 1. Each student shall be exposed to alternative teaching styles through models.
>
> 2. Each student shall explicate his own teaching style.

3. Each student is to provide a rationale in support of his preferred teaching style.

4. Each student will have a series of nonevaluative interview within which to explore the meaning of behavior observed in the laboratory and practicum for the learner's definition of teaching style.

Specifications for the Personalization Process

There are no specific, independent learning experiences within the ComField instructional program designed to bring the personalization of professional competencies about. Personalization experiences are always a part of an instructional system designed to produce a given competency and will take whatever form that is required to permit the exploration of personal relevance or meaning within that system. (See Figure 4.5, page 139.) Almost always it will involve contact with another person, however, either a peer or a member of the staff; and it will almost always focus upon the affective dimension of that which is being learned. Since there are no specific provisions for the process and since it has been described in some detail as it links to the development of professional competencies only the basic features of the process will be described. These may be considered as specifications.

1. Instructional activities designed to increase students' awareness of their personal qualities and the implications of these for teaching style are to be included as an integral part of the program.

2. Assessment of all cognitive outcomes is accompanied by an assessment of the commitment held toward them.

3. Assessment of student performance is accompanied by an assessment of the congruence between behavior and that basic personality characteristic of the student.

4. Performance below criterion level leads to assessment of the basis for the failure and consequent remediation. Dismissal is more nearly based on an apparent lack of potential to perform the task rather than a punitive or arbitrary measure.[1]

The last statement in the description of the personalization process at the top of page 104 says "performance below criterion level leads to assessment of the basis for the failure and consequent re-

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[1] Northwest Regional Educational Laboratory, A Competency Based, Field Centered, Systems Approach to Elementary Teacher Education (OE-58020) Washington D.C.: USOE, 1968, Volume I, pp. 102-103f.

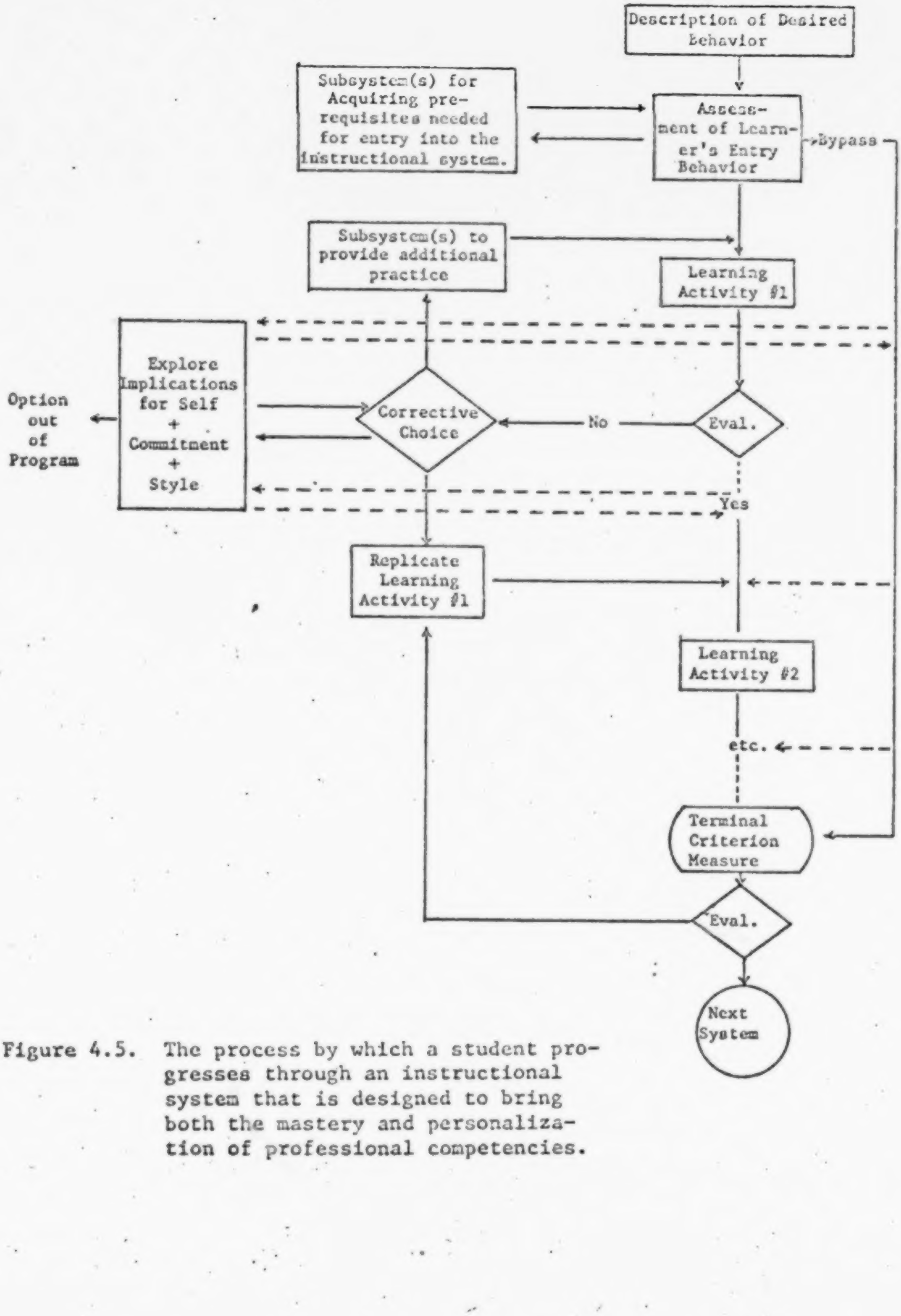
Description of Desired Behavior
Subsystem(s) for Acquiring prerequisites needed for entry into the instructional system.
Assessment of Learner's Entry Behavior
Bypass
Subsystem(s) to provide additional practice
Learning Activity #1
Explore Implications for Self + Commitment + Style
Option out of Program
Corrective Choice
No
Eval.
Yes
Replicate Learning Activity #1
Learning Activity #2
etc.
Terminal Criterion Measure
Eval.
Next System

Figure 4.5. The process by which a student progresses through an instructional system that is designed to bring both the mastery and personalization of professional competencies.

mediation. Dismissal is more nearly based on apparent lack of potential to perform the task rather than a punitive or arbitrary measure." Evidently then, within the specifications for personalization we have provisions for "deselecting" students who do not meet previously specified performance criteria. This is a strange kind of personalization.

The Syracuse personalization component, from which we think the ComField developers could borrow profitably, while it is very loose and somewhat unspecific in many places, is one way of providing for the reconciliation between the personal needs, interests and aptitudes of the student and the relatively rigid character of a modular systems model which is accompanied by quality control procedures.

The Teachers College system of organizaing students into inquiry groups which administer most of the teacher education program to themselves with the assistance of faculty counselors also provides a great deal of room for the kind of personalization that ComField says it wants but does not seem actually to provide, because it permits students to redefine goals and means while they move through the program. Quality control is vastly complicated by such a procedure.

The Michigan State storage-and-retrieval system for modules also provides a matrix in which personalization might be achievable. By making all faculty and students aware of what modules reside in the information-storage-and-retrieval system the personalization of a program becomes much easier, for the structure of the program becomes transparent and can be matched much more closely to the style of the individual. Without such a matrix and a guidance component to help the student retrieve and learn the modules that are most appropriate to his needs, the flexibility of the system model with respect to individuals would remain more apparent than real.

The University of Massachusetts Model

The Massachusetts Model emphasizes in philosophy the need for the individualized perparation of the teacher and an intermingling of human relations skills, teaching skills, and content knowledge. However, these are described so separately that the Massachusetts Model does not seem to have an essential point of view which unifies it or which represents its character or the character it would be likely to take on during development. As is pointed out in another place, a suprisingly large number of the Massachusetts modules do not have objectives which reach our criteria for behaviorality and, thus, they could not be implemented as they presently stand without tremendously greater specification. Furthermore, within many of the important components such as the teaching skills or the "behavioral" component, the skills often seem trivial compared with the rather strong statements of needed teaching strategies which characterize some of the other programs such as Pittsburgh, Syracuse, Michigan State, and the ComField Model. The objective of one module, for example, is "to get the teacher to ask as many questions as possible during the lesson, so that a beginning teacher's dependency on the lecture method can be overcome."[1] This objective is disturbingly chaotic. Furthermore, to ask a teacher to "ask as many questions as possible" seems irrational--does he do this regardless of what the children do? Also, does the instructional alternative (four micro-teaching sessions) have any real chance of reducing someone's dependence on the lecture? In other words, we had a good deal of difficulty determining the essential character of the Massachusetts Model.

Moreover, the program is almost completely without a philosophy, although it does deal with the affective development of the teacher to a laudable extent. Dealing with emotions without a philosophy can become unnerving at times. A module, for example, has as its objective within the area of race relations "the ability to recognize and deal with fear and sexual attitudes."[2] The instructional alternatives are as follows:

> The trainee will participate in a fantasy storming session about fear of physical attacks by blacks. Sessions--all white--will be hour-long and run for six times.
>
> The trainee will participate in an all-black fantasy storming session about fears and hatreds of whites. Six sessions, one hour long.
>
> The trainee will participate in a fantasy storming session about fear of physical attacks and sexual abuse.[3]

The team that examined this model is agreed that the ability to recognize and deal with fear and sexual attitudes in a racial context is very unlikely to be changed very much by six hours of fantasy storming sessions, and it seems almost a Kafkaesque world that would suggest that such might be true. Certainly fantasy storming sessions might open up such attitudes so that people could articulate them, and that might be the beginning of symbolic control, but if one really has fear, sexual fears particularly, that are racially linked, there will be no short-term course of therapy, even intensive therapy, that will change those fears; to pretend so is ridiculous. The Massachusetts Model is full of such absurdities. On one level they sound attractive because the Massachusetts Model certainly does deal with racial issues, ethnic issues, and one's personal need to develop a fully functioning self in a world which is laced with racial, ethnic, and economic class conflicts. However, when one looks at the specifications and finds out that a modular curriculum has been presented in which relatively short instructional systems are supposed to be effective in those areas, one has to questions the sincerity of the entire model.

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[1] University of Massachusetts, Model Elementary Teacher Education Program (OE-58022) Washington D.C.: USOE, 1968, p. 264.

[2] Ibid., p. 258.

[3] Ibid.

The whole section on sexual awareness in the Massachusetts program is similarly suspect. For example, let us look at sections from the final report of the project, pages 252-256.

In this entire section, the Massachusetts Model, quite laudably in our view, gets into areas which are extremely important in the functioning of the individual, both personally and as a teacher, and the designers of the Massachusetts Model do not shrink from a substantive involvement with sex or anything else that they think is important to the development of the individual.

However, their performance criteria are highly unspecific and their activities are not clearly related to the objectives. In areas as critical as sex, this seems to us to be a fatal blow to the feasibility of the program as it stands. The more critical and personal the areas, it seems to us, the more we must strive to be very specific in the description of objectives and activities, and the clearer we must be about the potential relationships among them. Evaluation in areas as critical and personal as these becomes a matter of the protection of the student as well as the assessment of him.

In addition, much of the material in those areas seems to be very loosely constructed. For example, in terms of the physical awareness of sexuality, the instructional alternatives are:

> The teacher trainee will participage in an Esalen-type seminar or series of seminars which centers on the freeing of the body, and its sexuality.
>
> The teacher trainee will teach a ten-minute micro-teaching lesson on the discoveries he made in the above described seminar(s) noting especially the part of his understanding that is significantly nonverbal.[1]

There is really only one instructional alternative here and it occurs in two phases, one of which is quite extensive (the Esalen seminar) and the other of which is simply a ten-minute lesson. How these relate to each other is not specified nor are we told what is to be done with the ten-minute episode in order to help the person perceive what he has learned and develop some views of himself in relation to the important area in question. A more powerful philosophy in the Massachusetts Model, we believe, would have avoided superficiality and disconnectedness of this sort. If one really cares about his trainee, one simply does not put him in encounter groups and then assume that the objectives of those groups have been achieved. He may use encounter groups to open up personally important areas and then provide experiences to help the student incorporate those experiences into his overall pattern of functioning.

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[1] The University of Massachusetts, Ibid., p. 254.

In short, to live up to its rhetoric, Massachusetts needs a philosophy. If it gets that, as well as a more unified model of the teacher during development, it could become a fascinating program.

The Michigan State Model

The BSTEP Model has as its essence the clinical behavioral style, and it conceives liberal and professional education as contributing in various ways to the development of that style and the individual variations it is likely to have.

The program is well unified around this conception of style, but a tremendous amount more could be done to unify the 2,700 relatively single-purpose modules into meaningful clusters, as is described on pages 126 and 127. In addition, the modules themselves are extremely uneven with respect to the specification of objectives, pre-requisities, and evaluation. The specification problem is easily rectified in a program which is developed over a longer period of time when there is time for a more adequate quality control than was possible in the eight months in which the original models had to be completed.

To make the essence of the model really powerful, however, the BSTEP developers have to face a very complex and delicate problem, one which, as they resolve it, should have a considerable yield for the improvement of systems design procedures. That is, the extreme disjunction between the program and the clinical style that the teacher trainee is himself supposed to manifest when he has completed the program. A student, in other words, does not live the model he is expected to become, but he lives in a very specific modular structure which is supposed by small increments to bring about the general kind of behavior he is to manifest later. The style of the program does not fit the behavioral style which the trainee is to adopt later.

The solution to this problem should probably be unique to the BSTEP Model, but developers can borrow ideas from some of the other models as they search for their solution. Especially, they might borrow from the Pittsburgh Model, whose program has almost an exact congruence with the type of teacher who is to be produced. It seems to us that it would be possible for the BSTEP developers to create a way in which their program could be administered to the students with the same clinical style that is specified for them. For example, a counselor could propose to and with the student what he should do next, then the student could operate as a self-teacher, or in taking seminars or lectures which are led by others, he could share the purposes of the teacher. He could then further propose, do and reflect once again. In other words, it is not the modular structure of the program which conflicts with the essential model of the program. It is that the modules were not constructed in an organizational matrix that permits the clinical behavior style to be as much a part of the teacher education program as it is later hoped it will be a part of the behavior of the teacher. This, we feel, is a

Figure 4.6. Selected Modules from the Michigan State Model

```
*OBJECTIVES     1, TO DEVISE SUBJECTS, SEQUENCE AND TASKS IN CONCERT WITH 02481 27
                STUDENT IN ORDER TO FULFILL A STATED OBJECTIVE,  TO DESIGN02481 28
                LEARNING ACTIVITIES WITH PUPILS,  2, TO ANTICIPATE OPTIMAL02481 29
                GROUP INTERACTION AND DECISION-MAKING THROUGH CLASS       02481 30
                GROUPING AND LOCATION,                                    02481 31
*EXPERIENCE     1, THE TRAINEE WILL, IN WRITING! A, STRUCTURE A           02481 11
                HYPOTHETICAL INSTRUCTIONAL SITUATION BY SPECIFYING        02481 12
                LEARNER CHARACTERISTICS ≥E,G, AGE, ABILITY, BACKGROUND,   02481 13
                ETC,+, CONTENT AREA ≥E,G, THE COMMUNITY, CREATIVE WRITING,02481 14
                ETC,+, OBJECTIVES AND ENVIRONMENT,  B, ESTABLISH AN       02481 15
                APPROPRIATE CLASSROOM ARRANGEMENT AND GROUPING WHICH      02481 16
                WOULD OPTIMIZE GROUP INTERACTION AND DECISION MAKING,     02481 17
                2, IN AN A-V LABORATORY HE WILL THEN AUDIO TAPE RECORD HIS02481 18
                INSTRUCTIONS AND SYNTHESIZING ACTIVITIES WITH THE         02481 19
                HYPOTHETICAL CLASS,  THE INTENDED RESULT IS A GROUP PLAN  02481 20
                FOR SUBJECT, SEQUENCE AND TASKS TO ACHIEVE THE STATED     02481 21
                OBJECTIVES,  THE TRAINEE IS FREE TO REPEAT THE ACTIVITY   02481 22
                UNTIL HE IS SATISFIED WITH THE PRODUCT,  3, AFTER         02481 23
                SUBMITTING THE WRITTEN STATEMENT AND TAPE, HE WILL RECEIVE02481 24
                FEEDBACK FROM THE INSTRUCTOR REGARDING THE IMPROVEMENT OF 02481 25
                THIS PRACTICE TEACHING EXPERIENCE,                        02481 26
*SETTING        INDEPENDENT                                               02481 10
*MATERIALS      TAPE RECORDING EQUIPMENT IN AUDIO-VISUAL LABORATORY,      02481  5
                TAPES FOR STUDENT USAGE,                                  02481
*HOURS          1                                                         02481  6
*GENERAL        ALL CANDIDATES                                            02481  7
*LEVEL          ALL GRADES                                                02481  8
*FILE           GROUP PLANNING  SELECTING SUBJECT MATTER                  02481  9
```

```
*OBJECTIVES     TO DEMONSTRATE ABILITY TO MAINTAIN EFFICIENT AND EFFECTIVE02675 15
                WAYS OF COMMUNICATING WITH AND CONTROLLING CHILDREN.      02675 16
*PREREQUISITE NONE                                                        02675 17
*EXPERIENCE     TEACHER CANDIDATE WILL OBSERVE CLASSROOM TEACHER≥S+ USING 02675 11
                VARIOUS TECHNIQUES FOR MAINTAINING ORDER, GAINING         02675 12
                ATTENTION, AND CONTROLLING NOISE LEVEL AND WORK HABITS OF 02675 13
                THE CLASS ≥READ OR SIMULATED+.                            02675 14
*SETTING        SMALL GROUP ≥1-12 STUDENTS+  SCHOOL                       02675 10
*MATERIALS      BLANK                                                     02675  5
*LEVEL          ALL GRADES                                                02675  8
*GENERAL        ALL CANDIDATES                                            02675  7
*HOURS          1/2 TO 3/4                                                02675  6
*EVALUATION     STUDENT IS ABLE TO DEMONSTRATE THE USE OF VARIOUS SIGNALS 02675 18
                AND TECHNIQUES TO CARRY OUT DAILY CLASSROOM FUNCTIONS     02675 19
                EFFICIENTLY AND FREE FROM INTERRUPTIONS,                  02675 20
*FILE           FIELD  DISCIPLINE  PRACTICUM                              02675  9
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*OBJECTIVES     TO IDENTIFY DANTE≠S ATTITUDES CONCERNING MAN≠S PROPER     00722013
                RELATIONSHIP WITH NATURE,  TO COMPARE AND CONTRAST THOSE  00722014
                ATTITUDES WITH SOPHOCLES≠ AND JOB≠S ATTITUDES AND WITH    00722015
                ANALYZE THE REASONS FOR THAT RELEVANCE                    00725016
*PREREQUISITE PREVIOUS MODULES                                            00722017
*EXPERIENCE     DISCUSS DANTE≠S ATTITUDES CONCERNING THE PROPER           00722011
                RELATIONSHIPS BETWEEN MAN AND NATURE,                     00722012
*SETTING        SMALL GROUP (1-12 STUDENTS),  COLLEGE                     00722010
*MATERIALS      BLANK                                                     00722005
*LEVEL          ALL GRADES                                                00722008
*GENERAL        ALL CANDIDATES                                            00722007
*HOURS          1                                                         00722006
*EVALUATION     IN SMALL GROUP DISCUSSION THE INSTRUCTOR WILL EVALUATE THE00722018
                STUDENTS≠ ABILITY TO IDENTIFY DANTE≠S ATTITUDES, TO       00722019
                COMPARE AND CONTRAST THESE ATTITUDES WITH PREVIOUS        00722020
                READINGS (ON THE HEBREWS AND THE GREEKS) AND WITH THE     00722021
                ATTITUDES OF THE CONTEMPORARY WORLD,                      00722022
*FILE           MEDIEVAL EUROPE  DANTE  MAN VS NATURE                     00722009
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Michigan State University, *Behavioral Science Elementary Teacher Education Program* (OE-58024, 3 vol.) Washington D.C.; USOE, 1968, pp. III-58, III-200, IV-99.

relatively easy problem to solve, at least conceptually, but an important, even necessary, one for the BSTEP developers if their program is to realize the considerable potential it has.

The Syracuse Model

The essence of the Syracuse Model is the intent-action-feedback transaction which is to characterize the life of teachers and students within the model. In the professional sensitivity component, together with the use of decision points and the system for bringing modules together and relating them to each other, the overall design of the Syracuse Model is quite compatible with its essential model and is quite strong in its presentation to the student in that it lives up to what it says it does in terms of the intent-action-feedback model. It is our impression, however, that the model still leaves the student awfully alone in an enormous sea of components and that some of the devices which reside in some of the other models might be used to overcome this at least partially. Especially, it appears that some kind of counselor-advisee group could be formed that could help students relate to each other over their general progress and stimulate one another to get ideas for the many modules in which students can substitute activities for those which are suggested in the model specifications. Such a group would help provide a form for informal feedback that could make the program stronger and a social context for decision-making that could provide the student with solidarity as he works his way through the labyrinthine program.

Although, as usual, we are reluctant to suggest any of our local medicine for someone else's problems, the inquiry groups from the Teachers College Model might well be used within the context of the Syracuse Model to provide some of the psycho-social glue that appears to be lacking and a context in which students can become committed, through the formation of a reference group, to the kinds of ideals which lie at the social and philosophical core of the Syracuse program.

The University of Georgia Model: GEM

We see the University of Georgia Model as the "job analysis model" because it is a prototype example of one kind of systems planning--the kind which begins with the specification of a job description, makes a detailed analysis of that job, and then systematically plans experiences which are likely to add up to that job competency. The components of the model are, in turn, developed directly from the task analysis. The almost complete absence of any learning theory except behavior modification and the absence of program or module strategies which are based on other theories of learning contribute to the impression of the Georgia Model as a classic of the systems stereotype described by Jacques Ellul.[1]

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[1] Jacques Ellul, The Technological Society, New York: Alfred A. Knopf, 1964.

Taking the model on its own terms and not trying to impose other criteria on it, the model has to be judged in terms of the adequacy of the task analysis and the job description. Both of these tasks were carried out in enormous detail. Each of them have flaws which almost characterize the model and which we believe point the way to substantial improvements in the model. First, the task analysis is made, not from an actual job description of a teacher developed from a study of a teacher in action, but from a hypothetical model of a teacher developed by individuals considered to be experts in teacher training. The model was developed entirely at the behavioral level, that is, in terms of sets of behavioral objectives rather than a unified overarching conception of the teacher from which behavioral objectives could be described through a job analysis.

In other words, instead of describing a certain kind of teacher and then breaking that down into specific functions, they described a general functionary called an elementary school teacher and described him in terms of specific behaviors which became the objectives of the Georgia program. In the course of the development and implementation of the model, we believe it would be greatly strengthened if this position were reevaluated and if an overarching conception of the teacher could be developed. There are numerous examples of what this conception might be like in the various models. The Michigan State conception of clinical behavior style, the ComField conception of a person with the competency necessary to bring about certain kinds of learning, the University of Pittsburgh conceptualization of the teacher as an individualizer and the Teachers College conceptualization of the teacher as an innovator--all should be heuristic examples from which the Georgia developers could draw in strengthening their specific model.

Similarly, they describe the elementary school child in terms of specific behaviors rather than in terms of an overarching description from which the specific behaviors could be derived. They did not conceptualize him, in other words, to be a creative thinker or an intellectual or a social activist or a productive citizen or in any of the other ways a student might be conceptualized. They proceeded directly to describe the desired behaviors of the child in rather specific terms, again without an overall philosophical conception under which to describe the behaviors which could be developed. As a result, many of the behaviors within the program seem to have an ad hoc character and seem to be unrelated to one another.

The Georgia development plan calls for the development of a performance module for each of the more than 2,500 objectives of the program. Such a large number with no overall unifying conception leads to a program of extremely "atomic" character, as discussed in an earlier section of the chapter.

Management Systems

The massive modular programs which will result when the models are developed and implemented depend for their feasibility on extremely efficient management systems which can store modules, coordinate support services, relate program elements to individuals, store assessment data, and be used for resource management and program improvement. In the feasibility studies, management technology was uniformly employed to estimate costs, generate developmelnt schedules, and plan the management of implementation.

Individualized, performance-based education for large numbers of students in any area cannot be conceived unless contemporary management systems are employed. In addition, program revision depends on continual assessment with redevelopment of poor program elements and smooth integration of the fresh components into the ongoing program.

All the models assume this and they have specified very similar management systems or implied them by other specifications. The requirements of the systems are exemplified by the Florida State proposal:

> Overview
>
> The computerized management control system (CMCS) can best be conceptualized in terms of the needs of the various users of the system. One type of user will be the trainee and the professorial staff who are assisting the trainee. Their primary interest will be in determining the "location" of the teacher candidate in the training program, what behaviors should be learned next, etc. The system should provide these users with information for counseling the trainee in terms of the instructional alternatives which are available to him. It will also serve as a record of his past performance. (The exact nature of the trainee's record will be described later.)
>
> A second type of potential user of the CMCS is the administrative force which will be required to implement the training program. Their primary problem will be one of allocation of human and material resources. Certain program activities will require the availability of rooms with videotape recorders; others will require small rooms which can be used for group discussions. At certain times faculty members will be required to be on campus, while at other times, they will be needed as observers in the schools and in-service centers. In order to anticipate these needs and prepare for them, the administrators must be fully aware of the resources which are required for implementing the program, and must be able to determine the rate at which trainees will require access to various facilities and resources.
>
> The third type of system user is the curriculum developer and the researcher, the people who are responsible for producing the instructional materials and experiences and for monitoring the success of each of these. It may be

anticipated that this group will be composed of a large number of specialists in such areas as content, audio-visual devices, professional writing, curriculum, and educational research. Their interests will not be limited to a single trainee's total score on a criterion test, but rather on the performance of a large number of students on each of the subcomponents within a task. In addition, they will want to determine the relationship between the trainee's present performance and his past and future performances. This information will be used to revise the various activities and materials, and to determine the feasibility of various instructional sequences.

Two-System Concept

The analysis of the potential users of the CMCS indicates that some of the users, namely the teacher candidates and professional staff, will need to have access to the information which is in the system on an as-needed basis. This suggests that the CMCS should operate in real-time, i.e., the trainee or faculty member would be able to have access to the information via a remote terminal at any time during the day. The information in the system, in turn, should be accurate and up-to-date. On the other hand, the program administrators and curriculum developers have more lead time in terms of their requests for information. For example, the administrators could receive a weekly or semi-weekly status report on all students and an indication of anticipated resource needs. The curriculum developers would work with researchers in planning exactly what data they would like to retrieve from the system in order to evaluate their own materials and activities.

This further analysis of the users and their demands upon the system indicates that not only will they have various lags in terms of the time required to receive information, but they will also be seeking different types of information. The trainee and professor will want information about the events related to a single trainee; the administrator will want information on single events.

Therefore, it is proposed that two interrelated systems be developed. The first system will serve the trainee, the professor and the administrator; it will operate in real-time, via remote terminal access for the first two users, and will operate in batch mode for the administrator. The second system will operate only in batch-mode and will be entirely oriented toward the needs of the curriculum developer. These two systems will be further explicated in terms of systems concepts, input and output procedures, and hardware and software requirements.

The real-time management system will utilize the management tool called Program Evaluation and Review Technique (PERT) for the control of a trainee's program. A review of the management requirements of the program and the management assets of PERT for appropriateness of fit might be desirable....

Real-Time Management System

The best way in which to conceptualize the real-time management system is to consider a very large PERT network. The entire network represents the total training program for one trainee....The full implication of the use of the network can be shown through a discussion of the five basic types of information which will be included in the system:

1. trainee background information;
2. sequential list of criterion behaviors or events;
3. PERT network and trainee progress records;
4. list of activities available for achieving each event; and
5. estimated times to achieve each objective.

Trainee Background Information. For each teacher candidate, there will be a short record of his skills, interests, and aptitudes as he enters the program. The information in this record will include that information which is most often used in counseling trainees: high school and university grade point averages, various aptitude scores, relevant experiences, and interests.

Sequential List of Criterion Behaviors or Events. A list of numbered events will be inserted in the system so that in addition to indicating that the trainee has mastered event 057, a printout can show that he has demonstrated the ability to use probing techniques.

PERT Network and Trainee Progress Records. A numbered pathway for each student will be established. As a student completes an event the following 20-digit record will be inserted:

1. trainee identification number (3 digits);
2. event identification number (3 digits);
3. number of times the trainee has repeated the event (1 digit);
4. minimum score acceptable on the event (3 digits);

5. score achieved by the trainee on the event (3 digits);

6. date that criterion instrument was attempted (6 digits); and

7. indication that a comment is associated with the trainee's performance (1 digit).

For instance, a sample trainee record such as 057 547 2 078 085 020668 1, could be interpreted as follows:

> This is a record for trainee 057's performance on objective 547. The student took the criterion test two times. The minimum acceptable score on the criterion is 078; the teacher candidate has a score (on his second try) of 085. The evaluation took place on February 6, 1968, and a comment has been recorded relative to the trainee's performance.

If the trainee is required to repeat an event, the most up-to-date record will be available on the system; previous records will be stored and made available as needed. Itam seven, above, will consist of a "1" if the professor or trainee wishes to make a comment about this event. Otherwise it will be a "0". A list of these comments will be generated with their associated trainee and event numbers, and will be available as needed.

List of Activities Available for Achieving Each Event. This list will be available for each event. It will indicate what materials and activities may be used for achieving each objective. At the initial stage in the development of the entire program, the only means for achieving a particular event might be by taking a particular course. As the program expands and becomes truly individualized, a great number of alternatives may be available to the trainee. The advisor would assist the teacher candidate in his selection of the most appropriate alternative.

Estimated Time to Achieve Each Event. A critical element of all PERT networks is the estimate of time required to carry out each activity. There are usually three estimates: optimistic, pessimistic, and most likely. Initial estimates of these parameters will often be based on very little concrete data; however, after a number of teacher candidates pass through the new training program, time estimates of this type should become quite realistic and therefore should be included in the computerized management control system. Such information would be invaluable to the program administrator as well as the trainee and his advisor.

The five features described above characterize the real-time management system. More details will be indicated in the sections on input and output and systems requirements. We now turn to the essential characteristics of the batch-mode retrieval system.

Batch-Mode Information Retrieval System

This system will serve primarily curriculum developers as well as educational researchers who will use these data to explore a variety of training hypotheses. It will essentially be a very large data base from which specific types of information may be retrieved in order to be summarized via standardized data analysis techniques. The basic information in this system will be of two types: (1) trainee background information; and (2) detailed trainee performance information.

Trainee Background Information. There will be a complete file on every trainee which includes all the information which is gathered as part of the selection procedure. This information is described in detail in another part of this document. In general, the file will include such information as scores, attitudes toward children, self-image, and openmindedness. It will also include information on the trainee's progress during the first two years of college, including such items as course performance, academic interests, and extra class interests.

Detailed Trainee Performance Information. This will be a complete file of all the teacher candidates' performances on all activities in the program. For activities which require the development of certain cognitive skills, the data may be in the form of results of a multiple choice test. If the activity relates to the learning and demonstrating of a certain technical skill in teaching, the data may represent the results of an observational checklist.

The purpose of these data will be twofold. The curriculum developer can retrieve that data which are relevant to the activities which he has created. The data will be invaluable in the formative evaluation and revision of the instructional materials and activities. The curriculum developer may wish to use the background information on the trainees to stratify his data in various ways; e.g., performance of junior college vs. home institution trainees. The second purpose of the data will be to investigate the relationships between background information and performance in order to make the training appropriate to various types of teacher candidates, to enhance the validity of the selection procedures for the program, to predict success in inservice activities, and to investigate alternative sequences for the instructional events. More details on this information retrieval system appears in the sections on input and output, and systems specifications.[1]

Although there were some differences, the Florida statement contains the essential requirements for the computer assistance needed to operate an intricate program and provide for its continuous regeneration through curriculum development. The provision for regeneration may be the most radical departure from previous teacher education programs, for the modular curriculum design permits replacement of curriculum elements as new ones are developed. Continuous assessment and redevelopment enables a rate and precision of curriculum improvement not possible without computerized management, just as the student-oriented aspect of management permits individualization and personalization of a sort not previously conceivable.

Florida State was concerned in its feasibility study to test the capability of its CAI system to monitor instruction and also sampled the reaction of students to the management process and the modular curriculum. The results were generally positive, leading toward more extensive testing of more complex groups of curricular elements and the ability of the management system to handle more complex demands.

The type of research conducted by Florida State and the subsequent research to test the feasibility of the specified management systems are essential to lay a basis of information on which development and implementation can proceed, for there has been almost no real-world experience with this type of management system in educational application. The specified systems appear eminently logical, but there are many important human considerations about which little is known. Systems which are flexible enough in industrial application may not be capable of adapting to human needs unless they are extensively modified--or they may work without essential modification.

Research in this area is urgent simply because the entire modular approach depends so absolutely on an effectively functioning management system. There is little point in speculating on the feasibility of the management systems without direct tests.

The ComField short statement of specifications makes clear the importance of the management aspect of the models:

Specifications for the ComField Management Model

Content Specifications

Content Specification 1. The management model shall contain the support functions required to permit a

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[1] Florida State University, A Model for the Preparation of Elementary School Teachers (OE-58018) Washington D.C.: USOE, 1968, pp. 135-143.

ComField based instructional program to operate.

In order to operate, the ComField Instructional Model requires eight support functions: 1) management of the instructional process per se, that is, managing teaching-learning interactions; 2) development of the instructional systems for use in the program; 3) continuous evaluation of the effectiveness and appropriateness of the program as a whole; 4) continuous adaptation of the program in light of its systematic appraisal; 5) program execution; 6) personnel selection and training; 7) maintenance of equipment, supplies and facilities; and 8) maintenance of the information management system needed to permit all of the above to occur.

Content Specification 2. The management model shall contain a supporting function designed to provide cost/effectiveness data on all operations within a ComField based program, as well as the program as a whole.

Two demands are placed upon such a function:

1) an accounting of the resource requirements (full system costs) needed to operate and maintain ComField; and

2) the provision of cost statements reflective of product costs, effectiveness and impact.

Organizational Specification

Organizational Specification 1. The management model shall be organized in such a way that all functions within it will have as their aim the enhancement of instruction.

Too frequently the founding purposes of programs are lost sight of or are relegated to a position of secondary importance as time passes and the demands of operation take their toll. With so many functional components needed in its support a ComField based program is particularly susceptible to this threat; any of the support components could readily become "an agency unto itself." The management model...is the result of an effort to create an organizational operational framework that protects against this kind of danger. Conceptually it:

(a) places the instructional program squarely in the center of things,

(b) stresses the idea that information and directional influence flows both from the instructional component to the support units and vice versa, and

(c) provides for a continuous flow of information to the policy-adaptive component and hence to the program execution component.

While such a model cannot guarantee that all units within a ComField based program will act in concert, it does provide an operational framework which at least makes it possible.[1]

The critical factor in the success of such a system is the development of an appropriate interface between user and system (as recognized in the Florida Study) and the workability of the program elements themselves. The conception of the teacher and its breakdown into elements around which components are built has to be skillfully done and program elements have to be skillfully interrelated or the management systems cannot function properly.

The conceptions of the management systems seem sound; if the programs are well-conceived, the management capacity as outlined in the proposals is more than adequate to monitor development and implementation.

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[1] Northwest Regional Educational Laboratory, A Competency Based, Field Centered Systems Approach to Elementary Teacher Education (OE-58020) Washington D.C.: USOE, 1968, pp. 34-35.

Chapter Six

The Model of the Teacher:

Is a Generalist a Set of Specialists?

The goal of a performance-based teacher education, whether for initial training or at the in-service level, is expressed in terms of a working model of the teacher.

In this chapter the argument is presented that the concept of a teacher who will fill a complex role is a conception of a set of specialists, whether one person or several engages in the specialized types of teaching that are defined. This stance contrasts sharply with the traditional one in teacher education--which is that teach ing is a generalized activity of which specialization is a variation.

There is no such thing as a generalist in education. Some people can simply do more specialized things than others. But hardly anyone can do more than a few things well.

Traditionally teaching has been viewed as a generalized capacity to relate to children, substantive content or skills, and instructional materials. Teaching competence has been viewed as an ability analogous to intelligence--it would pervade a large range of activities which teachers might perform.

The experience of innovative movements in education has shown us that the conception of teaching as a general capacity to educate is erroneous and disfunctional. Most teachers simply have not effectively adopted the new roles or learned the new strategies unless a massive inservice effort was made.

However, if teaching is thought of as the ability to provide a particular, specialized kind of educational service, it becomes at once apparent that there are a multitude of specialized services which make quite different demands on the teacher. For example, helping children write creatively is different from teaching biology inductively. Helping children use instructional systems is different from providing counseling for them. No doubt some teachers can, without special training, move from role to role and strategy to strategy. That a few can do this should not deceive us into making the inference that all teachers can learn to do it as a result of general or even special training.

It is far more productive to view teaching as a set of role-competencies each of which has to be learned specifically. From this stance a teacher becomes a person who can engage in one or more types of teaching. If one can master enough teaching strategies in enough domains, then he can become a generalist--someone who does a lot of specialized things well. It also may be true that persons who learn several specialized roles can master new ones more easily, much as the learning of one or two foreign languages decreases the time and effort necessary to learn others. It also may turn out to be possible to provide some generalized training (perhaps in certain basic skills or knowledge) which will greatly facilitate the learning of new roles and teaching strategies.

What are the practical implications of this stance that a generalist is a set of specialists?

First, it permits us to identify the roles we would like the teacher to play and to train him specifically for them.

Second, it assumes that innovation requires the learning of new knowledge and skills which have to be made explicit and trained directly.

It prevents us from thinking that we can make a change in education simply by getting some "good people" together and pointing them in a new direction.

Third, as an extension of the first point, it enables us to turn teacher education into a technically feasible activity because specialized teacher roles and strategies can be identified and specialized training can be designed to accomplish them.

Finally, it suggests that we determine teacher competence not by indicators of general quality but by evidence that he can do particular jobs. A teacher of high generalized capacity would not be *assumed* to be competent for any teaching role or situation.

How Can Specialized Roles Be Defined?

The role of a teacher can be defined as the capacity to provide a certain kind of educational environment--to lend a certain kind of support to a learner. In the following pages several kinds of educational types are defined in order that we can consider the generalist-specialist problem more concretely.

The educational roles are presented in the form of a proposal for an elementary school organization that employs several actual schools or institutions, each employing a particular teaching model or combination of models designed to further certain aspects of the student's education.

Different Kinds of Education

The recreation of the institution begins with the recognition that we have been trying to make one institution stretch over a variety of educational tasks that really require a large number of institutional forms. To get at this problem let us begin by identifying several of the kinds of education that are critical for today's children and then see if we can figure out the types of institutions and models that best serve those kinds of education.

First, children need to learn the basic skills and historical and geographic knowledge that will enable them to sort out today's world and teach themselves throughout the rest of life. Time-honored reading, writing, and arithmetic are essential, but also needed is a knowledge of contemporary technology. They need to learn to use printed media, especially to learn to read and write, and to communicate through other media (as through dramatics, film and television), as consumers of those media (and for some children as creators). They need a knowledge of the workings of our governing body and of our economic system. They need to be able to compare and contrast our culture with other major world cultures, in terms of politics, economics, art and social dynamics. They need to comprehend the world and the kinds of economic, racial and political problems that beset the nations the world over. We can refer to this need for skills and knowledge as the basic skills and knowledge education of the child. The goals of this education are set outside of him. We want him to acquire this education and feel it is necessary for his development. We want to induce him to learn these things because they are the storehouse of our common culture that he will have to stand on as he builds his individual way in society, and they are the skills and knowledge that he will need in order to relate to the rest of us. Although children differ in the amount of basic education they will absorb, it is a shared education that gives them more in common.

A second kind of education begins with the child. We can think of it as personalized education or education for idiosyncracy. It is designed to help him develop on his own terms and to become as unique as he can. A personalized education begins with the person's own particular talents and special interests and helps him develop these on his own terms. At certain times in his life, a personalized education will simply help him explore his interests. He may read through favorite authors or learn to play a musical instrument or design and build his own rocket. At other times, it may help him build a new career or a depth of knowledge in a certain area. In any case, however, it is desirable that everyone, and not simply the academically talented, have a part of their education devoted to their personal development.

A third kind of education has as its goal to help youngsters learn how scholars work or what we might call academic inquiry. It teaches them how social scientists analyze human culture, and how scientists build and test theories. It helps them try on the ideas of mathematicians and to learn how literature can be analyzed. This kind of education introduces the student to the most sophisticated ideas of his time, and helps him to learn how the academic community continues the struggle for knowledge. It is that kind of education which has been the object of the academic reform movement which has been going on in education since the middle 1950's and which resulted in the curricular changes known as the "New Math," and the "New Science" and so on.

As presently practiced in the schools, academic inquiry is sometimes dull and sometimes exciting. When it is carried on in the right way, it is always exciting, for it involves powerful ideas and systems of ideas. Like basic education, academic inquiry begins outside the child.

Yet a fourth kind of edcuation introduces the students to a dialogue on the nature and the future of our society. This kind of education focuses on the critical issues and values of our culture. It deals in controversies and helps the student to sort out the issues in controversies, the kinds of values over which we are struggling, and to debate alternative solutions to our collective problems. At the present time, this kind of education would focus on the problems of alienation that divide us, on the problems of urbanization and mass society that are confounding us, on the political issues on which we are joined as we attempt to forge the future of our society, both with respect to domestic affairs and international affairs. This education is critical not only for the "radicalized" youth who are demanding that at least part of their education be built around the reconstruction of their society, but it is just as critical for the apathetic youth who uncritically conform to the society without questioning it or engaging in the struggle to improve it. It helps the student learn to engage in the democratic process, to participate in the sharpening of issues and the development of alternative solutions to problems which confront us.

We could include many others kinds of education--aesthetic education, human relations training, creativity seminars, awareness training--the possibilities are many. However, for illustrative purposes only, let us look more closely at these four and design a set of institutions to accomplish them.

A Basic Education

The proper teaching of skills and basic knowledge requires great individualization. Children learn to read at vastly different rates, and both good readers and poor readers have characteristic problems that require individual attention. Some poor readers are such because they have general language problems, others because they have a specific problem of some sort. Some good readers have problems, such as in the application of phonics or in the development of their vocabulary, and these too require individual attention. An institution that asks a teacher to keep track of the range of individual differences that occur in reading, writing, arithmetic, basic skills and knowledge in the social studies and basic skills and knowledge in the sciences is simply overburdening the individual teacher with information to process. Teachers simply cannot do it. If they can diagnose adequately the individual problems in the basic skills and knowledge area, a teacher who is asked to teach one subject to a hundred students, or five or six subjects to thirty students, simply cannot find the solutions he needs to the panorama of individual differences that confronts him. However, in the last few years, we are beginning to experiment with institutional arrangements that show great promise for this kind of education. For example, at the University of Pittsburg Research and Development Center and the Philadelphia Regional Laboratory Research for Better Schools, there are being developed and tested general systems for instructing individuals in the basic skills and knowledge area, in such a way that the pattern of individual differences is accommodated. Such a system consists of a diagnostic program in which an individual is tested and otherwise examined, and his pattern of individual development in an area such as arithmetic is assessed. On the basis of that assessment, the teacher makes a prescription for the youngster. The youngster takes his prescription to a storage center of self-instructional materials. He is provided with materials that match the prescription and he works on those materials, which may be tapes, programmed material, workbooks, or books with instructions, and as he completes each section of work, an embedded test provides an indication of whether he has learned the things which those materials were designed to teach. On the basis of that assessment, the prescription is modified, and he continues in the same manner. Similar systems are being built using films, television tapes, and other media, and combining them with teacher-administered instruction. There is presently going on a major program, sponsored by the United States Office of Education to develop teacher education programs on the same basis, with television being used to provide a diagnosis of the teacher's capabilities and instructional systems being provided to give the teacher practice in the skills that he needs help in, to teach him how to use television tape to view himself and make further diagnoses, and to track his own progress. At the Far West Laboratory in Berkeley, a series of self-instructional courses for teachers called Mini-Courses have been developed using a similar approach.

The kind of school that is good for basic skills and knowledge education is one that provides for elaborate diagnosis in the areas concerned, prescriptions based on the diagnosis, and then treatment or instruction closely tuned to the developmental pattern of the individual. Under such a system, some individuals complete the course of study in a very short time, others can take a very long time over the same material. Some will complete some kinds of development very quickly, and linger over others, but in any case, instruction is tuned to the individual.

Personalized Education

Systems like the above, however, cannot very well provide an education which helps each person to do his own thing, to explore his own capacity for creativity and his own personal interests. For that, we need an institution which enables the student to meet with his teacher on a one-to-one tutorial basis so that the teacher can explore his interests and capabilities, and help the student develop a program which fits those needs and desires. The tutor, in addition to being able to help the student find his interests and develop his own educational program, has to be backed up by the kinds of instructional resources that can be shaped to an individual need. Some of these resources need to be other teachers, who might work at the school on a full or part-time basis, as artists, musicians, and writers. Good libraries are essential, and can include banks of motion pictures that the student can use to teach himself, television courses, particularly short courses that he can draw on when he needs them, laboratory materials, shops, and so on. The institutional arrangements that make for good personalized education are the tutorial relationship and the battery of open-ended resources backing it up. The existing school as an institution is very poor for this kind of education, perhaps even worse than it is in basic skills and knowledge education. The teacher, meeting with large numbers of students and teaching large numbers of subjects, simply cannot provide the tutorial time necessary. Imagine for example, an English teacher with only a hundred students (and that is very few students for an English teacher) trying to instruct students in grammatical skills, help them learn to read and analyze literature better, trying to provide them with creative writing opportunities, analyzing the products of those opportunities and providing feedback; who in addition to that would be able to meet with interested students on a regular basis to provide tutorial help? It is safe to say that the only kind of tutorial help provided in such an institution is built around the skills problems of individuals or is given to the highly talented. The average student simply cannot be catered to in such a situation.

Learning What the Scholar Does

The third education is to learn how scholars analyze human society, how they engage in scientific activity, and how they analyze literature and art. The institutional arrangements which are appropriate for this enable small groups of students to get together to analyze critical problems, applying tools of the social sciences and the other sciences as they are appropriate. They need the advice and counsel of skilled teachers who themselves enjoy engaging in scientific inquiry and who enjoy doing so with young students. In addition, they need to be backed up by library equipment and by instructional materials prepared by scholars which introduce students to the modes of analysis that the scholar uses.

In the present institution, we are beginning to have instructional materials which can be used for this purpose. They are materials that have been developed by anthropologists, political scientists, physicists, chemists, mathematicians and others, which can help youngsters explore the scientific disciplines and apply these to the study of their society. Even in areas like Black Studies, which are relatively new in the schools, the paperback book has brought much material to the junior high student and above, although the area is still lacking. What we do not have is an adequate supply of trained teachers who are themselves competent to do academic inquiry and who enjoy doing so. Nor do we have an institutional arrangement which provides the opportunity for small groups of students to work together with such teachers with relative leisure. Physics classes, poured in four or five a day on the science teacher twenty-five or thirty students strong, simply cannot engage in the vigorous, leisurely analysis of significant problems long enough to acquire the modes of inquiry of the discipline. The present institution, in other words, has shortcomings on two fronts--one is the proportion of teachers who are prepared to give this kind of education, and the second is a kind of institutional arrangement that does not permit the time-consuming cooperative inquiry characteristic of this kind of study.

Engaging in a Dialogue on the Critical Problems of Society

There may have been a time when it would not have been critical for the education to induct the student into the long dialogue over the nature of human society and ways of improving it, although we doubt it. But it is clear that today we cannot turn away from this kind of education as an important component of the student's life. Even if it were not the case that we were aware of the society's serious problems, and even if the adult community were not engaged in serious debate over alternative ways of coming to grips with the problems: of the internation, the cities, our relationships one to another, our need to achieve broader representation, our need for aesthetic improvement--even if these were not a part of the dialogue of the adult society, the students would be insisting that we include important issues, values and alternative solutions in their education. Until quite recently, there was much less of this kind of education in the schools than should have been the case because so many people felt that the schools should steer clear of controversy, that the study of critical values were matters for the home and not for the schools. That day is gone, thank goodness, but the institution still has severe difficulties in this area for two or three quite obvious reasons. One of the most important is that there is a conflict between instruction and the carrying on of dialogue. A teacher who is preoccupied with teaching skills to his students, is inhibited from engaging them in the slow processes of debate and analyses of social issues. The teacher often feels that when he gives time to the study of society he is robbing the student of important skills and basic information that will enable him to get on later. Second, many teachers have little experience or taste for this kind of education (while a few enjoy it greatly and regard it as of paramount importance). Third, many of the instructional materials that have been prepared for the consumption of school children have been deliberately bland and have avoided the issues. Partly this was from good motives, although they seem questionable today, or at least are questioned today, in that many educators did not feel that children are able to deal with the deep problems of the cities and the international arena. The responsibility does not lie in the hands of the textbook publishers alone, for the kinds of materials that were produced no doubt reflected the kind of market that existed. At any rate, the supply of materials is slowly changing and some honest efforts are being made to provide the schools with the kind of information sources that children need if they are to debate the serious and interesting issues of the society. The institution, however, will have to change in a number of ways if there is to be much effect in this domain, for it has always been organized so that it tended to isolate the students from the society. Education is not _inherently_ irrelevant, but it is if it is carried on in a child's world. The problems of the mayor's office, and the problems of the Congress take place a long way from the local public school. Also, the public is in general very nervous about the school's role in inducting the students into the hurlyburly of political and social debate. (Parents and other citizens are afraid that the school might induct the students to a point of view which conflicts with their own.) The present controversy over sex education illustrates this. The public is not afraid that the students will not eventually learn about sex, what it is afraid of is that the sexual attitudes that will be developed by the students will not correspond with their own, and many people would prefer to see the school leave sex and politics and many social issues alone, rather than risk the development of a different point of view from the prevailing one, or the one held by the parent or concerned community members.

The conditions for dialogue include an immersion in controversy, an openness of discourse, and an intention to act. These require an institution which is staffed by teachers who enjoy dialogue and where students are helped to engage themselves in deep issues and to see them through.

Putting It All Together

We have outlined four kinds of education, and now we must talk about the possibilities for accommodating them. To break with our ways of looking at the school, let us dream a bit into a future in which we don't have one kind of school trying to serve all our diverse kinds of children or fulfilling all the possible kinds of education we want for children. Instead of one school, let us imagine several kinds of education, each one to help our children in a particular way. Let us begin our dream by reiterating our objective of providing four kinds of education for our children: basic education, education for idiosyncracy, academic inquiry and education for dialogue.

We have chosen these four kinds of education because they are very different in terms of goals, and yet all of them will seem important to most people. They are all necessary for a humane, contemporary education. They will not, by any means, satisfy every man's desire for an education for his children (or kids' desires, certainly). Nor are they the only way of describing desirable education. But they can get us started on the way to thinking through a new kind of schooling and schools.

For the schools which we have inherited from our past generation were designed only for the first kind of education--basic skills and information. Worse, perhaps, they were designed better for elementary skills in reading and writing than for solid engagement with information about a contemporary world. We have stretched them and pushed them. We have changed their shape, building them in round shapes, in clusters of cottages, in television studios and in great libraries. For all its failings in basic education, however, it is that kind of education that the present does best. Helping students develop on their own terms, helping them engage in academic inquiry, and helping them participate in a dialogue on the nature of society are things that our school does much less well than it does basic education, whatever may be its faults in that direction. In short, we have a one-purpose school, which does none too well at that one purpose, trying to do many jobs!

Suppose we dream of a kind of educational system that encompasses the four kinds of education and which provides them all to our children with equal efficiency. What would that educational system (school?) look like? Let us take each of the four kinds of education in turn and see what each one needs.

Would we put all these four kinds of education under one roof anywhere? I think not. We can have self-instructional centers scattered throughout our city which can accomplish basic education. Individualized self-instructional systems together with tutors in the basic subjects can work in neighborhoods for the young children and in large library type complexes for the older children. A diagnostic system needs to be developed so that one can determine the stage of each youngster's knowledge and skills, and develop the kind of learning situation appropriate for him. If he cannot learn using self-instructional material, experts in basic education may teach him to read by having him write stories that he reads himself, or by having him select material that he can relate to easily (adventure stories for some, biographies for others, even "Dick and Jane" for some.)

The second kind of education requires a lot of open-ended resources and requires that the student meet his tutor regularly. For the younger children, this also could occur in the neighborhood, and for the older children library-like complexes will be appropriate. In these complexes, we can have banks of television courses, films, self-instructional materials of various kinds, libraries, laboratory equipment, and the other kinds of things that young people need in order to develop on their own terms and follow their own interests. In our large cities we have artists, musicians, artisans, and many others who could work part-time in such centers offering their services. In neighborhoods and in center cities, art centers, music centers, literature centers, film studios and the like can attract a substantial clientele of children.

Academic inquiry in the sciences and mathematics can be carried on in laboratory centers equipped for the purpose. Some of the scientific inquiry might be centered around the traditional academic areas, other parts should be directly related to our current problems. The study of human ecology could be carried on right in the environment--our waters are there to be studied, as is our air, our earth, and the other things that fill our space. In the social sciences, the whole human environment is the laboratory: our industries, our armed forces, and our government and our international relations. Our local government is here to be studied. Our problems of overcrowding and transportation and poverty and of our search for love and joy are everywhere around us and can be studied. Centers for the study of these things can be established throughout the city. Some should be in every neighborhood so that the younger children can have ready access to the center. Others, for the older children, can be located where it makes the most sense from the point of view of study. Around our transportation facilities, for example, are the possibilities for a myriad of centers and they will not lack for problems. Our ghettos, our money markets, our banks, our churches, our theaters, our industries, and our commercial world are all places in which there should be centers where children gather to study and reflect on their social world.

And where shall we carry on a dialogue with the children? Partly, of course, we should use our mass media for this purpose. Our political parties can present programs beamed to the young identifying problems from their point of view. But most of all, they need to be brought together in groups with the kind of adult that likes to engage in a dialogue with the young. These places will not look like schools with children sitting in rows learning dead languages. These groups would go to our theaters, visit our government officials, interview delegates to the United Nations, and the other things that should happen when groups of ten or twelve or fifteen children meeting two or three times a week with a wise adult really pursue their inquiry.

The Four Kinds of Education and the Models ~~for~~ of the Teaching

We have spoken at length about different kinds of education and different types of dwellings to house them, but if each of the various educations are not transmitted in a manner or manners compatible with its aims, then they cannot be realized. Thinking of the teaching models as the learning medium, we may ask ourselves: What models of teaching could be used by such a school? Let us look at the available alternatives for just the four kinds of education we have been discussing.

Basic Education. In the previous discussion, we suggested a variety of behavior modification models ([illegible]), but these are not the only possibilities. Group Investigation ([illegible]) or Reflective Thinking ([illegible]) are possibilities. The modes of inquiry approach could be recommended. (As by those who feel that arithmetic is best learned in terms of academic inquiry into mathematics or those who feel that reading and "language arts" should be approached through linguistic inquiry.) Non-directive approaches have been used in the basic skills and information areas .. Ausubel's Theory of Meaningful Verbal Learning and his Advance Organizer strategy was constructed expressly for the purpose. Taba's Concept Formation ~~(Chapter Two)~~ and Bruner's Concept Attainment are particularly appropriate for basic skills and information. Perhaps a combination of models would be most appropriate especially because they would accommodate a variety of learning styles. Systems planning might create self-administering modular curriculum using behavior modification techniques (a la IPI) and modules structured around advance organziers or inductive strategies. Teachers called academic counselors might stand ready to assist the children and might use personalized teaching strategies modeled after Rogers or Hunt to help the children for whom the cybernetic system was not sufficient or appropriate to modify it for them.

Personal Education. Non-directive models appear superficially to be sufficient for this area. The non-directive model would certainly make much sense as the basic pattern for the tutor's behavior, as does Hunt's

Conceptual Systems Model . However, short courses built on Training Principles could be available in a kind of educational smorgasbord from which the student could select. In addition, courses built on Synectics principles could be offered for those wishing to try to develop their creativity. Awareness Training is especially designed for personal development. Inquiry training exercises might be made available for training in scientific inquiry.

Academic Inquiry. The academic inquiry models, such as Schwab's Science Inquiry Model , would appear to be ideal in this area. Groups of students could work together, trying on the modes of the disciplines and developing conceptions of the major ideas of the academic areas.

However, academic inquiry is not, by any means, the only possibility. The Advance Organizer model was developed to teach the structure of the disciplines and could be used as the major model in this area. Inductive and Reflective Thinking models also are used to structure academic inquiry, as are Inquiry Training models , Group Investigation and Social Inquiry . Models developed from developmental psychologies like Piaget's provide paradigms on which we could approach academic inquiry.

It could be reasoned that several models should be combined for this kind of education. For example, Group

The model presented above suggests that the elementary school teacher might be any one of a number of kinds os specialists. He might engage in more that one mode of activity, but it is inconceivaable that very many teachers would stretch over several very different modes.

It is possible to think of the model of the teacher in terms of three dimensions which would define his needed competencies and their limits. One is the age of the children with whom he sould work. A second is domain--the subject or skill area in which he would work. The third is mode or the type of general strategy which he would use. Thus, some teachers might be prepared to work with young children in science with academic inquiry modes. Others to work with older children in media with a mode emphasizing creative thinking. And so on.

In other words, there is a general choice between a generalizized model of the teacher and specialized models, which can be combined to develop the ceonception of the specialist. The use of the more specialized models permits the construction of more compact training programs which might well consume much shorter periods of time than the present ones. It is possible to conceive of a general basis for teacher training which might be acquired in universities or other academic settings, followed by training in inservice settings for the clinical competencies necessary to carry out specific modes of education in specific domains at particular levels of operation.

The Model of the Teacher and Innovation in Education

The generally trained teacher of the past has not been, on the whole, an effective innovator. He has been particularly ineffective in handling the institution of which he is a part in order to bring about changes in it.

One way of conceiving the teacher's inability to bring about innovative form of education is that while he may have been able to be effective in the general role of teacher, he has not had the capacity to teach himself the new models of education that the innovative roles have required. For example, let us suppose that one wants to open a school on the model created by A. S. Neill at Summerhill. One would, if he did so, expect to have to sort through a large quantities of teachers before he found even a small group who would be able to move into a physical environment and create a Summerhill-like type of education.

Performance-based approaches to inservice education can potentially be combined with innovative efforts ~~that~~ by organizing so that training support systems related to the appropriate models of the teacher are incorporated into the innovative effort. For example, supposing we were to attempt to build an educational program for children built around learning centers reflecting the formats described above. A teacher education support system could be attached to the operation in such a way that teachers could be trained for the mode that they were to staff. Those developing the idiosyncratic mode might be trained to Rogerian counseling methods; those who would staff the cybernetics system mode might be trained in the instructional management techniques and behavior modification techniques to such a precise type of education. Those who would staff the academic inquiry component or the academic inquiry centers could be trained to the appropriate teaching models to support those activities. In other words, the selection of the modes of education would be folowed by the identification of the appropriate models of the teacher, and these, in turn, would be followed by the construction of performance-based teacher training systems to enable the personnel to become competent in the appropriate model.

Chapter Seven

The National Teaching Style

The study of present-day teaching can enhance the development of competency-based teacher education by establishing the configuration of present teaching styles. The outline of this configuration represents the picture of teaching behavior which competency-based education is expected to change. The study of teaching behavior tells us how teaching behavior today compares with the models of the teacher which form the goal of competency-based programs.

The configuration is also useful because it permits an extimate of the magnitude of the difference between the working conceptions of the teacher which are presently acted out and the working conceptions which are sought. Thus value-differences are made more clear.

Our review of the literature on teaching suggests that:

1. There is a national teaching style.

2. It is very different from the goals of present performance-based teacher training programs.

3. It represents a normative conception of teaching which directly conflicts with the technical concepts of teaching which underlie most performance-based approaches.

From 1950 to 1970 there has been an increasing emphasis on the objective study of communication within the classroom. At this point, about eighty instruments have been developed for classifying communications between teachers and students and relating them to each other.

Although the results of this type of investigation have to be interpreted with the knowledge that the objective study of the classroom is still in its infancy, some of the consistent findings are striking especially because of their consistency with respect to the types of styles which teachers display. In fact, the results thus far indicate that we must approach the future of such studies with the proposition that the classroom styles of teachers are notable more for their similarity than for their differences and that *it seems possible that there is indeed a national teaching style which has certain definable characteristics*.

For example, the Interaction Analysis System developed by Ned Flanders has been the most widely used for studying teaching behavior; and in several dozen studies, the following generalizations seem to be warranted: about two-thirds of all teacher questions are concerned with narrow lines of interrogation which stimulate an expected response. In other words, teachers tend to ask questions for which there are definite answers, and the preponderance of these questions is so great that the classroom can be best described as a place in which teachers ask most of the questions and in which students are expected to have ready answers of the convergent type. (D-35)

Fewer than ten per cent of teacher communications in any way respond to a student's idea even to elaborate it or correct it. In very few of the nation's classrooms do a significant proportion of the teacher responses deal with pupil ideas, and we can say that there is not any likelihood at all that the student ideas are dealt with in any depth or adequacy in more than a tiny group of the classrooms.

A very small proportion of the communications in classrooms consist of questions asked by pupils. The range in some studies is only about one per cent to only about four per cent. Pupils, in other words, contribute very few of of the questions to classroom discourse. Rarely are more than ten per cent of the questions asked in a classroom asked by the pupil and, probably more important, nearly all of these questions are questions of clarification about subject matter or directions rather than questions which represent a line of inquiry by the student.

About nine out of ten of the cycles of communication in a classroom are initiated by the teacher--meaning that the game of the classroom is largely controlled by the teacher as chief player. (D-11)

Nearly all teachers are extremely direct in teaching style and the exceptions to this are very rare. Within this general style, there is considerable variation among teachers. It appears at this point, however, safe to generalize that in nearly all cases teachers are using very direct styles of instruction and the differences between most of them are variations on a theme rather than representing strategically different styles.

Evidence to support this generalization comes from the Joyce, Weil, Wald, Gullion studies of 1970-71 in which teachers who were deliberately trying different teaching strategies behaved in ways which are very rarely found in studies of the natural styles of teachers as they behave in the classroom. This was true for all of the strategies which were practiced indicating that a teacher who would be practicing a counseling strategy, a Group Investigation strategy, an inductive strategy, or a behavior modification strategy behaves in ways which are significantly different from even extremes in classroom style under normal conditions. One of the really astonishing things was that this finding seems true for teaching which is engaged in in settings other than the public school classroom. For instance, a doctoral dissertation by Browde contained the following conclusions: that Sunday School teachers do most of the talking in their classrooms, and most of the talking is direct; questions are utilized by the teacher, but most are limited questions requiring one answer; praise is rare and of the "short comment type," although church school teachers in Sunday School situations spend less time justifying authority than do public school teachers, and their children do about twice as much talking or contribute about twice as much to the interaction. Thus apparently Sunday School teachers are a somewhat milder variation on the theme of public school teacher. (D-73))

Patterns of Behavior As They Develop during Training

Over the last few years Joyce and his associates, Hunt, Dirr, Brown, Seperson, Peck, O'Donell, Wald, Weil, and Gullion have engaged in an extensive series of studies into flexibility in teacher behavior and into the influence that cooperating teachers have on the behavior of student teachers. During the course of student teaching student teachers become less rewarding than they are at the beginning, ask fewer questions, fewer open-ended questions; but the most striking change is in the amount of teacher behavior which invites the student to share in the shaping of the learning activity either by asking him how he feels about what is being done or asking him to contribute suggestions. This behavior is very common at the beginning of student teaching but almost disappears completely by its end. In other words, there appears to be a general funneling of those elements in the styles of the young teacher which might lead him to have a very different style from the national norm and which press him toward behaving in the accepted way. As he becomes less rewarding, more punishing, asks fewer questions and fewer open questions, plans less with students, he becomes more generally direct in his behavior. (H-C)

In some studies, feedback using Interaction Analysis techniques or micro-teaching have arrested this flow toward direct behavior, but up to this point there have been no studies in which the flow has been not only arrested but has been reversed. It is necessary in order to understand how we can bring about a greater diversity in teaching styles to understand the dynamics by which the apprenticeship aspects of training the teacher influence this funneling of styles. Toward this end, Seperson and Joyce conducted a study in which they determined correlations between student teacher and cooperating teacher behavior in the classroom and found very substantial correlations in most of the important dimensions of teacher behavior. Student teachers very rapidly once they have entered the classroom take on many of the behaviors of their cooperating teacher, and the process of influence continues during the association although it is not as strong over time as is the initial influence.

Rosenshine has conducted a series of exhaustive reviews of the patterns of teacher behavior and their relationship to pupil achievement which indicate that within the national style certain kinds of patterns produce greater pupil learning than do others:

1. Rosenshine concludes that the findings about relationship between teacher praise and pupil achievement is mixed with no definite conclusions being possible at this time. There appears to be some evidence that the most punishing teachers retard pupil achievement.
2. About the same kind of finding is true with respect to general indirectness of teacher behavior. The extremely indirect teacher and the extremely direct teacher seem to get different kinds of effects in favor of the indirect one,

but the result is not consistent in terms of a linear correlation.

3. Teachers who ask the most questions seem to get somewhat better results than others, but up to this point there is no indication that an open-ended question is more effective than a closed question. However, only a few teachers regularly employ a large proportion of open-ended questions. (D-35)

My interpretation is that the variables which are presently being investigated should not be expected to have substantial effects so long as they only reveal variations on the usual theme of teaching. In other words, if some teachers are somewhat more indirect than others, some reward a little more than others and others punish a little more, some ask a few more questions and others a few more open-ended questions; these differences in dimensions of the teaching act constitute only slight variations within a general teaching style. They are differences within a relatively homogeneous type of behavior inside a relatively homogeneous institution.

Joyce and Hunt have conducted several studies which indicate that teaching styles vary somewhat as a result of teacher personality. Teachers typed as more rigid apparently have more restricted styles and punish more, reward less, ask fewer questions and fewer open questions and plan less with students than do flexible personality types. The Joyce-Hunt work has been replicated by Murphy and Brown in an independent series of studies with about the same findings. The finding is somewhat disturbing because if teacher personality is too closely related to style, one may not be able to bring about a new style without making first a change in the personality. Fortunately, the Joyce, Weil, Wald, Gullion studies have [illegible]) (H-2) indicated that teachers of very different personality types can learn a very large variety of teaching strategies. This finding encourages us to believe that personality variables, while they may account for some of the variations in teaching styles, may not account for as much of the variation in trainability.

The general findings about teacher behavior are exemplified by the data in Table One which shows the results of the study of a group of teachers in the New York City area. Table One shows the frequency of questions asked by those teachers at seven various cognitive levels.

Table One

	Teacher Questions	Teacher Statements	Student Questions	Student Statements
Level 1	10.352	10.534	0.839	12.541
Level 2	5.457	5.270	0.171	7.419
Level 3	3.262	0.623	0.023	2.917
Level 4	0.535	0.010	0.010	0.370
Level 5	0.061	0.101	0.000	0.071
Level 6	0.021	0.000	0.000	0.010
Level 7	0.000	0.010	0.000	0.000

The frequencies indicate that the lower cognitive levels account for nearly all of the questions asked by the teachers. The fraction of communications at the high-order levels is very small. This is the kind of finding that has been repeated many times in the history of the study of teaching. It is accompanied by the fact that so many other dimensions of the teacher's behavior are in line with this kind of finding. For example, in their study, Brown and Joyce found that in more than twenty thousand communications by carefully selected cooperating teachers in the New York metropolitan area only eleven communications provided a reward to a student for an activity other than memorizing something or following directions accurately.

In a study in West Chester County, again of teachers who were carefully selected by school administrators as being outstanding, the kind of pattern described earlier was repeated; and, in addition, out of eighteen thousand communications which were directed at procedural matters in the classroom only thirty of those communications involved the student in a way which permitted his achievement, his needs, or his ideas to contribute to that determination. Nearly all of the procedural communications were simply the giving of directions, sometimes simple and sometimes more complex but always controlling.

The homogeneity of teaching styles, combined with the relative homogeneity of curriculums and school organization patterns, indicate that teaching has been a normative rather than a technical activity. That is, teachers have been behaving according to a normative concept about what teaching is, and they, consequently, lool similar when they are at work. A technical concept of teaching defines teaching as decision-making skills and teaching strategies which the teacher applies to each teaching situation. When he does this, the results vary greatly, for his decisions are different in every case and his strategies vary as a consequence. Hence, a technical concept of teaching leads to a more heterogeneous picture than we apparently have at present, because it assumes that teachers will use their skills to create a variety of environments tailored to the needs of their students.

Performance-oriented education has to be built on the assumption that teaching is a technical matter--a process of decision-making, interacting with children, developing of content, etc.. The clustering of teaching behavior around identifiable norms suggests that it has been an intuitive, imitative act.

Probably the implementation of performance-based education will require the socialization of the education profession into a technical stance which is foreign to the norms of contemporary practice.

Chapter Eight

What Would Be the Nature of a Comprehensive Competency-Based Training System?

It will take a number of trials to determine with any certainty what would be the nature of an effective competency-based teacher education system. However, the evidence thus far accumulated from these experiments which have been conducted(ch.3) combine with the experience of the systems builders who worked within the Bureau of Research's teacher education program(Ch.5) to form a base on which we can build emergent but workable guidelines for the development of a full system.

From the experiments and from software testing it appears that it is feasible to train teachers to a considerable variety of decision-making skills and teaching skills and strategies. What is not clear is whether we can build a complex training program comprehensive enough to prepare a teacher for the full role of classroom teacher or even for more limited specialized roles. There is absolutely no evidence that this cannot be done, however, and the success of military programs in training persons to very complex performance models encourages the belief that a program to train a teacher is feasible.

The experience in programmed instruction and the forms that have evolved from it suggest that training systems do not have to employ minute sequenced steps, but that moderate to large-sized steps are effective and have even greater client acceptance.

Cybernetic psychology has contributed the proposition that quite complex behaviors can be effectively learned under simulated conditions and transferred to field situations. By controlling tasks completely, cybernetic techniques can give superior results to the less controlled demands of field training. To have effective teacher training, however, requires that field situations be compatible with and reinforce training goals--field aspects of training must be compatible with the entire training system. As indicated earlier, the enormously complex roles of teachers in present schools may be untrainable--people may simply be unable to fulfill them.

Principles of Program Planning

Each of the Bureau of Research planners created the elements of their model programs by engaging in the completion of six tasks which are common to systematic program planning. Although systems procedures have by no means been standardized, the six tasks generally appear in any paradigm in systematic instruction although they sometimes exist under different names from the ones with which they will be described here and the order in which they are accomplished varies quite widely. However, there is a certain logic in the following order:

1. The creation of a "working model" of the teacher, described as interrelated sets of competencies and as a subsysten of the relevant larger environment in which the teacher works (teams, schools, communities, support systems, etc,).
2. The analysis of this model into streams of related competencies that can form the basis of components of the training system.
3. The selection of component strategies and the development of specifications for components.
4. The creation of the overall training system, especially interlocking relationships among components, support systems, and communication systems.
5. The organization of management systems to monitor progress, program elements, and program testing and revision.
6. The reconciliation of the program with the client (student) and the field (educational system). This step must be synchronized to the other steps.

In Chapter Five the Bureau of Research projects were analyzed in terms of the models of the teacher which were created and the sets of interlocking components which were developed by accomplishing the six tasks outlined above. Competency-based training system consists of a description of a model or series of models of the functioning teacher. Each of these models is broken into elements which represent aspects of the teacher's functioning and which are accompanied by training systems which attempt through the use of direct instructional means to accomplish the development of those competencies and the teachers who are the clients of the system. Each of the training components is designed in a "modular" form, which simply means that it is divided into sections each one of which consists of its performance objectives, the experiences designed to achieve those objectives, and evaluation devices to determine whether the competency has been achieved. Thus, we find a series of conceptions of the teacher and a set of training systems to provide competence in aspects of each conception. Finally, the entire system is organized under a management system which permits the progress of each student to be tracked reliably and information to be fed back to the student himself so that he can modify his performance; to the faculty so that they can help counsel the student and provide him with alternative training; and the program managers and developers so that they can determine which aspects of the program are functioning well and which are not and can attempt to respond to the development and managerial level to correct the problems which arise.

The conceptions of the teacher can vary by level, domain, and curriculum mode as indicated in the previous section, and, in addition, one may envision hierarchical teams in which students may prepare to be assistants or aides or general instructional developers and managers (master teachers). It is possible, of course, to try to produce a generalist, but I cannot suggest too strongly that a generalist is a collection of specialists. Rogerian counseling, managing an instructional program, using simulation games, and leading groups of students in inquiry are by no means homogeneous behaviors. One can simply not prepare a general kind of person called a teacher and expect him to be able to work in every domain, model and level. It is possible to conceive of a person who has mastered a number of modes, domains and levels, and such a person might function as a generalist although I do not think very many of the people entering teaching have the capacity to reach such a comprehensive level of performance. It is more likely to imagine that a certain number of teachers might be prepared to be general managers of teams and to relate to a variety of modes which are staffed by personnel trained in special ways to the special competencies which are required of those modes.

It seems essential and agreed on that comprehensive performance-based training has to effect not only the trainee but the sites in which he is trained. To train a teacher to a particular type of performance and then find that one does not have a school in which he can do practice teaching and practice that type of performance is an absurdity and would soon make cynics of everyone, including the teacher trainee. Thus, it is essential that comprehensive performance-based programs be operated by consortia of institutions representing training capacity, management capacity, and institutions which educate children so that the training programs and the educational activities within the institutional settings can be coordinated to a high degree. This seems particularly important because of the evidence that performance-based training is most effective when it is accompanied by a curriculum revision and the availability of materials for children. It is hard to imagine, for example, that one could train a teacher to function effectively in the I.P.I. system unless he had one present and operating with children. At any rate, assuming that one might be able to do so, it would be absurd.

A comprehensive performance-based system relying, heavily, as it would, on modular instructional systems, should almost certainly use cybernetic techniques, especially simulation, in many of the phases of training. Nearly all of the systems models use simulation, not simply because it is a fad, but because it permits training to occur in unified sequential segments that relate to the other.

Chapter Nine

What Would Be the Nature of a Competency-Based Teacher Center?

The function of a competency-based teacher center within an educational area (a complex of schools serving a defined geographic area) is to provide three types of flexible teacher education support to the educational effort:

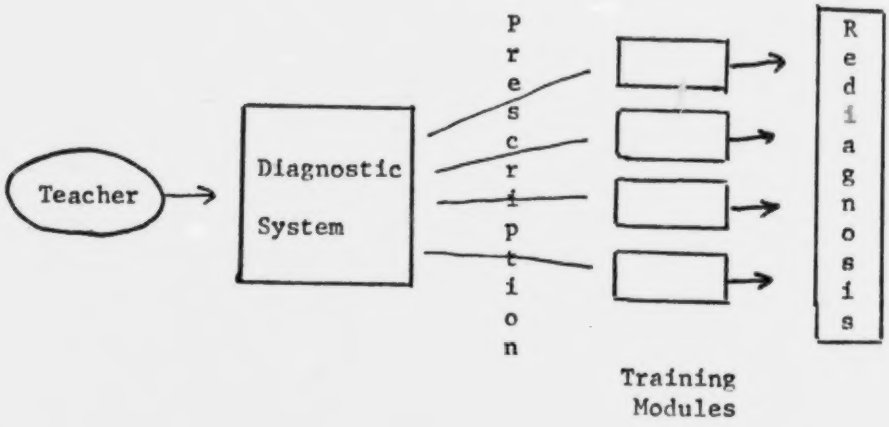
1. General support through training to improve teacher competence within defined teacher roles. This support should be guided by diagnosis of teacher performance in the area with training concentrated in the domains of greatest need in terms of the educational priorities of the area. For example, if a priority in the area were English as a Second Language for young children, training might be concentrated but not limited to competency in that domain.
2. Flexible support to teachers by helping them diagnose their performance and receive training to increase specific competencies in terms of their needs. For example, if a teacher wishes to improve his skills in affective education or in inductive strategies, or in diagnostic skills, training would be provided on the most individual basis possible.
3. Support to innovative efforts within the area. For example, a teacher center should be capable of providing support to all phases of a general innovation like the Parkway School in Philadelphia or to a thrust in school organization (such as the establishment of open-plan schools built around learning centers) or to a curriculum reform thrust (such as the improvement of instruction in a curriculum area such as science or reading).

To fulfill these missions, a teacher center will have to develop a combination of precision and flexibility which probably cannot be obtained without the magnitude of development effort required to create a comprehensive teacher education program.

Each of the three missions of a teacher center requires diagnostic capability, a flexible modular training system, and a management system for relating the two, monitoring effectiveness, and organizing program revision.

A teacher center need not offer all possible services but could be developed to accomplish limited training objectives or types of training support within the three types of mission, but even in a limited center precision of diagnosis, training and management would require a complete system of interrelated diagnostic, training, and management functions.

Thus the effectiveness of a center will depend on the definition of working models of the teacher or aspects of teacher performance, and the development of training systems to bring about competence within the models of performance. If this is accomplished, then the mode of functioning of a teacher center can be diagrammed thus:



Without a reasonable flexibility in training components the mission of a teacher center would have to be quite specific and limited. The greater the array of training components, the larger the mission of support can be and the greater its flexibility in meeting teacher needs.

Whether training and assessment occur in field settings, laboratories closely related to field settings, or at univeristies, a great deal of software is necessary to bring a competency-based inservice center into being. Fortunately, a great deal of software is being produced presently and nearly all of it is realted to specific competencies.

As in the case of any teacher education program, the selection of the goal. in this case the performance model of the teacher, is of vital importance because it reflects a preference for the kinds of education teachers will be trained to provide for children.

Appendix

The Enormous Software Problem

One of the requirements that distinguishes competency-based teacher education from other approaches to it is the need for great quantities of software in order to implement it. The software is needed to serve three purposes:

1. Assessment. Assessment tasks of a variety of types require materials which present the tasks, rating forms and record-keeping devices.
2. Instructional. To present instructional alternatives to students, extensive materials are required. The greater the individualization of the program and the greater the array of alternatives for pursuing objectives, the more elaborate the software has to be.
3. Management. To track progress and provide information to students and faculty, to coordinate support systems, and to enable counselors and students to achieve control over events, an elaborate software complex is required. (See pp. 204 to 237.)

The creation of enabling software is in its infancy, and most of the products to date are fragmentary. The accumulation, however, is beginning to be substantial and organizations such as the Far West Regional Laboratory have developed rigorous product development and testing paradigms which have considerable promise.

In the following pages there is a description of presently-available material with illustrations of its applicability in a performance-based teacher education program.

INTRODUCTION

Background of the Project

Competency or performance-based education grew out of the recent, nation-wide effort to improve teacher education. Motivated by the same desire, the National Teacher Corps requested its various local programs to move toward competency-based education in the design of their own training programs. This is no small task, as developers of the Elementary Models of Teacher Education programs can attest. Merely conceptualizing a sound, integrated performance-based program is a full-time job. Coupled with the details of implementation --developing or obtaining the material supports, training and coordinating the teacher education faculty and providing a comprehensive management schema-- the job is monumental, especially if programs begin from scratch.

Recognizing the difficulty of the task, the National Teacher Corps provided its local programs with assistance in their efforts to develop competency-based training programs. First, consultant services and workshops explaining the rationale and procedures for designing a comptency-based program were provided. Second, Teachers College, Columbia University, was asked to identify and describe performance-based materials that were available and could be incorporated into local Teacher Corps programs. This report is the result of that effort.

Organization of the Report

The framework for the report emerged from our desire to maximize its potential uses. At the beginning we imagined a simple list and description of performance-based materials -- an annotated directory. However, as we began identifying and previewing the materials, we discovered that the state of performance-based materials was not highly developed. Some means of analysis was required to reveal the substantive gaps and behavioral limitations. Second, a functional classification system was needed to facilitate programmatic decision-making and integration. The report is intended, then, to both describe and analyze, to serve the purposes of materials selection and decision-making at the program-design level and to point up the present state and future needs of performance-based materials.

These purposes are reflected in its organization. The sections include this introduction which outlines the background of the project and the organization of the report, describes the procedures for selecting, classifying and describing the materials, and provides a summary analysis of the present status and uses of the materials; an alphabetical Listing of Competency-Oriented Materials for Teacher Education; A Classification of Competency-Oriented Materials; Descriptions of Previewed Materials; Short Descriptions of Non-Previewed Sources; and Additional Sources About Competency-Based Education. The introduction includes two descriptive charts. Figure B compares the format of the sources: the kind of behavioral objective attended to, the activity structure of the program, and the administrative features of the program. Figure A identifies the Behavioral Status.

Selecting the Materials

Some clarification on the nature and scope of the materials selected for this report is necessary because several kinds of sources related to performance-based education are presently available. Our focus was on identifying competency-oriented materials that would be the basic software for instructional modules. This parameter excludes general sources about competency-based education, as well as specifications for modules. However, in the course of our search, some excellent examples of these two types of materials did come to our attention and we have listed their sources in a special section of the report.

The substantive range of the materials includes "traditional" teacher education content as well as preparation for new educational forms and positions. Materials for training the teacher supervisors or team-leaders (a Teacher Corps staff position) were also included. Though our search was conducted for Teacher Corps whose programs involve preservice teacher training, the materials we located are applicable to inservice as well as preservice uses. In fact, the distinction is probably a spurious one!

The crucial criterion, of course, in selecting these materials was whether their form met the requirements of performance-based education. Initially, this meant the specification of behavioral objectives, the provision of adequate measures to assess those objectives and the identification of required levels of performance. It became evident very quickly that few programs met these behavioral standards (hence, the shift in the title of this report from Competency-Based to Competency-Oriented Materials for Teacher Education). Out of necessity our criterion loosened to include materials either explicitly or implicitly specifying behavioral objectives or for which behavioral objectives could be readily ascertained and/or those materials that provided a semblance of criterion measures, however behaviorally imperfect. In practice, this excluded only the usual textbook or printed sources and filmed sequences. Programmed texts and filmed sequences accompanied by provisions for analysis and discussion were included.

Probably many more sources than those described here meet this liberal behavioral criterion. This list cannot be viewed as exhaustive but merely exemplary of the kinds of products being developed. We know, for instance, that there are now many materials describing behavioral objectives -- what they are, the different kinds, and how to write them. We have not located nor listed all of those sources here. The relative state of abundance is generally true in highly defined areas such as behavioral objectives. In areas of less definition, the repository of materials is thinner.

Over fifty sources were contacted by telephone, letter and personal contact, including directors of the Models of Elementary Teacher Education programs, the Regional Educational Laboratories, the Research and Development Center for Teacher Education, selected commercial sources, technical assistance persons for Teacher Corps programs, and colleagues in teacher education. The result is a listing and description of approximately sixty material sources. Most of these have been previewed by the authors of this report. A few have been described by the developers of the materials. All of the materials are available or will be available shortly.

Format of Descriptions

There are two sections of materials descriptions. The first includes sources that have been previewed and are generally available. These are described and analyzed rather extensively. Sources that were not previewed or are available on a limited basis make up the second section of short descriptions.

The format of the descriptions in section one includes the following information: title; author or developer; publisher or source; cost; special ordering instructions; type of materials such as printed material, videotapes, filmstrips; a description of the purpose, content, organization and administrative features of the materials; a description of the sequence of activities teacher-candidates would be engaged in while using the materials e.g. discussion, reading, micro-teaching; objectives and criterion assessment, an analysis of the present behavioral status and potential of the materials; and possible uses in existing teacher education programs such as clinical experiences connected with student teaching or methods courses.

Several terms are used interchangeably throughout the descriptions -- student, participant, teacher and teacher-candidate refer to the preservice or inservice teacher-in-training, the target-audience for these materials. Micro-teaching means an actual teaching experience with children while peer-teaching refers to a simulated teaching experience with one's peers such as role-playing.

Classification and Analysis of Materials

To facilitate decisions about materials selection and program design the previewed materials described in this report have been analyzed in four ways. First, an eleven-category system was developed for classifying the major competency-type, substantive emphasis or function of the materials. The categories are:

1. Basic Interactive Teaching Skills
2. Instructional Planning and Design Skills
3. Teaching Strategies
4. Analysis of Classroom Activity: Interaction Systems and Guides
5. Instructional Decision-making (Problem-solving)
6. Student Diagnosis and Evaluation
7. Foundations of Education
8. Content Areas
9. Media and Instructional Technology
10. Educational Staffing and Instructional Organization
11. Staff Development

This is a crude, hybrid classification system reflecting both emergent teacher education programs built upon behavioral competencies and those built upon a traditional, subject-matter course structure. This particular schema, probably a result of intuition and intention, initially served as an impressionistic taxonomy that provided some order to our search. It is included in this report for its heuristic value in program design and materials selection. Many alternative classification systems are possible such as those based on role conceptions of the teacher or program components. This schema does not dictate program design; it is simply a vehicle for perceiving the relationships among behavioral competencies, program content or materials and program structure.

The materials have also been analyzed for their behavioral status, the kinds of behavioral objectives attended to, their activity structure and administrative features. The format for each of these analyses can be seen in the figures below.

Figure A

Assessing the Behavioral Status of
Competency-Based Materials
for Teacher Education

Title	Needs Specification of Objectives	Objectives Need Refining	Needs Assessment Measures

Assessment Measures Need Refining	Needs Level of Performance Identified	Complete

Figure B

Assessing the Objectives,
Instructional Format, and Administration of
Competency-Based Materials
for Teacher Education

	Objectives					Instructional Format					Administration			
Title	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psychological	Micro-teaching	Simulated Teaching	Group Discussion	Observation-Writing	Reading-Writing	Self-Administered (Individual)	Self-Administered (Group)	Instructor	Coordinator

Further explanation of the categories and the actual classification and analysis charts can be found in the section on Classification and Analysis of Competency-Oriented Materials.

Present Status of Materials

An analysis of the materials described here reveals some interesting patterns in regard to the degree of "completeness" they exhibit. This quality of completeness has several aspects.

In the section on Classification of Materials a chart is included which indicates the "behavioral" status of each item. Very few materials are rated as complete in the sense that they have: specific behavioral objectives stated; adequate assessment measures provided; required levels of performance identified. About one third of the materials need further specification of objectives. In most instances these objectives seem implicit in the materials and can probably be produced locally without much difficulty. One fourth of the materials lack assessment measures, but again in many instances these can be derived fairly readily from the existing materials. Almost all of the materials lack identification of required performance levels. This is the area that needs immediate work at the local level if a competency-based program is to be instituted. Some might consider this an inadequacy of the materials, but it may well be that identification of performance levels is a decision best reserved for those using the materials in the local situation.

Another aspect of "completeness" of materials is the range of types of behavioral objectives represented. This information is also included in the section on classification. Five types of objectives have been identified in the Handbook for the Development of Instructional Modules in Competency-Based Teacher Education Programs. They are: cognitive objectives; affective objectives; psychomotor objectives; demonstrative objectives (demonstrating teaching behaviors); consequential objectives (demonstrating changes in pupil behavior); expressive objectives (experience only). The available materials are heavily (over half) in the area of cognitive objectives. About one third of them are based on demonstrative objectives. None of them are designed for consequential objectives, and relatively few for expressive, affective, or psychomotor objectives. It will be fairly easy for local programs to design modules around expressive or psychomotor objectives, but much thought needs to be given to the designing of materials for affective and consequential objectives. Probably the best way to move immediately is to revise and extend existing materials using demonstrative objectives. With minor additions many of these could be developed to include consequential objectives.

The materials seem to be more complete as regards variety of instructional activities involved. The type of activity most frequently used is an observing-writing format. Observations may be in actual settings, such as classrooms, but more often they are based on films, videotapes, or slide-tapes. Students describe their observations, or respond to prepared questions, in writing. Several other types of learning activity are well represented. These are: reading-writing format; group discussion format; simulated teaching format; actual (or micro) teaching format. This variety of instructional formats is a strong point of the materials, for it enables the program planner to provide a more balanced learning experience.

Much the same variety exists as regards types of administrative procedures. A large number of materials are designed for self-administration by individual students. An almost equal number are developed for administration under the guidance of a knowledgeable instructor. A very few are organized for use with a group under the guidance of a "coordinator," or an instructor who is not particularly knowledgeable in the field. Several materials are set up for self-administration by small groups of students. Varying the administrative procedures also provides strength to a program, but the large number of materials designed for administration by a knowledgeable instructor emphasizes the need for staff retraining implicit in reorganizing for performance-based programs. Most teacher education faculties are not presently knowledgeable in the areas that these materials emphasize.

An interesting sidelight to this consideration of "completeness" of materials is the fact that the variety which exists may well be a happy accident. In analyzing the materials it became evident that each regional lab or development center has tended to specialize in a particular type of material. For example, the Far West Lab's minicourses involve cognitive and demonstrative objectives in a micro-teaching format which also makes use of observing-writing activities. The minicourses are all self-administered by individuals. Most of the programs developed by the Northwest Lab are based on demonstrative objectives in a group discussion format, and are administered by a knowledgeable instructor. Materials produced by the Research and Development Center for Teacher Education tend to be organized around cognitive objectives, for use in a reading-writing format, and they are self-administered by individuals. It is fortunate that this tendency to specialize resulted in development of a variety of types of materials, but it is important to note that a program must tap several sources in order to take advantage of this phenomenon.

Considerations for Program Planning: Individual Differences, Sequence and Integration

The question of variety of available materials is important if one assumes that a teacher education program should be responsive to individual differences. Typically, materials developed to enhance individualization of instruction respond to only one or two aspects of differences: differences in rates of learning and differences in areas of interest. Only rarely is there an opportunity for the student to vary his instruction relative to preferred amounts of structure or direction, preferred styles of thinking, preferred means of communication, or preferred amounts of human interaction. A program that is truly geared to individual learning patterns needs to take these factors into account.

Only a few of the materials reviewed here provide options within them which would allow for adaptation to individual differences of the latter four types mentioned above. Almost all of these options are in the area of administration of materials; for example, the materials on questioning skills can be self-administered by an individual or by a group. This particular type of flexibility would seem to relate chiefly to differences in preferred amounts of human interaction.

Happily for the program planner who does wish to provide more individual options, there is some variety of both instructional format and administration of materials within each category area. Some variety of types of objectives also exists within each category area. This variety can be seen by studying the charts which appear in the section on Classification of Materials.

Consider the problems and possibilities in relation to selection of materials in the category of "basic interactive teaching skills." Under the topic of questioning skills there are two types of materials available. The minicourse materials utilize a micro-teaching format and are self-administered by an individual, while the Allen materials (General Learning Corporation) on questioning skills utilize a simulated teaching format and can be self-administered by either an individual or a group. It is probably not economically feasible to have both types of materials available to teach an area such as questioning skills. But the program planner might provide variety and balance by choosing to use (for example) the minicourse to teach questioning skills, the Discovery Teaching Simulation materials to focus on reinforcement techniques, and "Facilitating Inquiry in the Classroom" to focus on interactive techniques related to problem solving.

All of these three items deal with questioning skills. The latter two deal with a number of other skills in addition. The Discovery Teaching materials utilize a simulated teaching format and can be administered by a group or by a coordinator. "Facilitating Inquiry in the Classroom" utilizes a group discussion format and is administered by a knowledgeable instructor. These three items, then, provide a variety of options to the student within the general category of interactive teaching skills. By careful selection of materials with an eye to the question of variety and balance, the program planner can provide options within each category area as well as options across category areas, thus achieving a good deal of flexibility in providing for individual differences in students.

Another important consideration is effective sequencing of materials. One possible basis for sequencing is the concept of "progressive increase of involvement." On this basis one might decide to begin with systems for observing children and/or classroom interaction (Analysis of Classroom Interaction; Foundations of Education), move to pre-active teaching skills (Instructional Planning and Design; Student Diagnosis; Decision-making), and finally to interactive teaching skills (Basic Interactive Teaching Skills; Teaching Strategies).

Another way to organize materials in sequence might be in relation to generality of ideas or skills. Some curriculum planners opt for starting with the more general and working to the more specific. In this type of organization, materials such as the Northwest Lab's "Facilitating Inquiry in the Classroom" and "Development of Higher Level Thinking Skills" would precede materials such as the minicourse on "Effective Questioning."

Materials might also be sequenced in terms of type of behavioral objective. One would begin with a set of materials organized around an expressive or affective objective, move to materials geared for a cognitive objective, and then progress to materials designed around demonstrative and consequential objectives. This cycle could be repeated several times in relation to various topics.

A program which is highly individualized may leave decisions of sequence of experiences up to the individual student. But even in this instance it will be important to suggest possible alternatives to the student. He will need to understand alternatives in order to exercise his options effectively.

A third consideration in program planning is the integration of these materials. For example, it is possible that the assessment measures in the category of basic interactive teaching skills could be behaviorally improved by adapting the materials from Observation Systems and Guides, or that measures for Planning and Design Skills could be coordinated with materials from Student Diagnosis and Evaluation. In addition to improving the behavioral status, coordination of materials can produce a more substantively integrated, in-depth educational experience. Materials can be selected so that learning activities in methods courses, foundations courses and clinical experiences dovetail with each other. For example, in a student's laboratory experience he can be learning a science inquiry teaching strategy and the basic interactive skills for inquiry (e.g. Facilitating Inquiry in the Classroom), while in a Science Methods block he is completing a sequence on instructional planning and design (e.g. The Teaching of Science: A Self-Directed Learning Program). Back in the clinical block he may then engage in instructional decision-making tasks.

Decisions, Decisions, Decisions

There are several decisions that need to be made prior to selection of materials for a program. Some of the questions that might be asked appropriately are:

1. What types of levels of behavioral objectives do we wish to emphasize most strongly?
2. What types of instructional format do we believe to be most effective?
3. What types of administration of materials will be most feasible for our program?
4. How much retraining of staff will be necessary for use of various materials?
5. How much revising of materials (or development of new materials) are we willing and able to do?
6. What aspects of individual learning patterns do we wish to provide for?
7. What basis will we use for sequencing of materials?
8. What materials seem to provide the most variety of uses in the most economical way?

The framework for describing and analyzing programs that we have used in this report may provide a basis for making some of these decisions.

A LISTING OF COMPETENCY-ORIENTED MATERIALS FOR TEACHER EDUCATION

Title and Author/Developer	Source	Page°
Analysis of Teaching Behavior Gene E. Hall	Research and Development Center for Teacher Education The University of Texas Austin, Texas	53 33,51
The Assessment Training Kit C. Lisa Lewis and S.L. Menaker	Research and Development Center for Teacher Education University of Texas Austin, Texas	55 51
The Basic Course: Teaching is Learning to Listen; Activities in Metaphor W.J.J. Gordon and Tony Poze	Synectics Education Systems 121 Brattle Street Cambridge, Massachusetts 02138	56 31
Basic Teaching Tasks: A Teaching Laboratory Manual for Beginning Teacher Candidates O.L. Davis, Thomas B. Gregory, Marcella L. Kyselka, Keven R. Morse, B.R. Smoot	Research and Development Center for Teacher Education University of Texas Austin, Texas	58 21, 25, 29, 31
*Behavioral Objectives Package	Southwestern Cooperative Educational Laboratory 117 Richmond Drive N.E. Albuquerque, New Mexico 87106	117
Cameras in Education Educational Media Laboratories	Technifax Education Division The Plastic Coating Corporation Holyoke, Massachusetts 01040	59 47
Classroom Behavior Analysis and Treatment Robert L. Spaulding	Dr. Robert L. Spaulding, Dir. Child Development Institute San Jose State College San Jose, California 95114	61 33, 37, 51
Classroom Management Simulation System Paul Twelker	Simulation Systems Program Teaching Research Division Oregon State System of Higher Education Monmouth, Oregon 97361	62 35

* Asterisked titles are found in the Short Descriptions section.

° First number refers to the description, others to the classifications.

Title and Author/Developer	Source	Page
Competencies in Mathematics, Instructional Strategies: Division E. Glenadine Gibb	Research and Development Center for Teacher Education University of Texas Austin, Texas	64 29, 31 41
Competencies in Mathematics, Instructional Strategies: Numeration E. Glenadine Gibb	Research and Development Center for Teacher Education University of Texas Austin, Texas	65 29, 31, 41
Competencies in Mathematics, Mathematics in the Elementary School: An Overview E. Glenadine Gibb	Research and Development Center for Teacher Education University of Texas Austin, Texas	66 29, 41
*Conventional Media Educational Media Laboratories	Technifax Education Division The Plastic Coating Corporation Holyoke, Massachusetts 01040	117
Critical Moments in Teaching (film series) and Guide for Independent Discussion and Study David Gleissman, editor	Holt, Rinehart and Winston, Inc. 383 Madison Avenue New York, New York 10017	68 35, 45
Developing Effective Instruction	General Programmed Teaching P.O. Box 402, 424 University Avenue Palo Alto, California 94302	70 29, 37, 47
Development of Higher Level Thinking Abilities John A. McCollum and Rose Marie David	Northwest Regional Educational Laboratory 710 S.W. Second Avenue 500 Lindsay Building Portland Oregon 97204	71 21, 25, 29, 31, 37, 41
Discovering New Dimensions in the Teaching Process Greta Morine, Robert Spaulding, Selma Greenberg	Intext Educational Publishers College Division Scranton, Pennsylvania 18515	72 33, 51
The Discovery Teaching Game Paul Twelker and Donald Kohl	Simulation Systems Program Teaching Research Division Oregon State System of Higher Education Monmouth, Oregon 97361	73 35

Title and Author/Developer	Source	Page
Discovery Teaching Simulation System Paul Twelker	Simulation Systems Program Teaching Research Division Oregon State System of Higher Education Monmouth, Oregon 97361	74 25, 27
Distar Series Englemann-Becker Follow Through Project	Science Research Associates 259 East Erie Street Chicago, Illinois 60611	75 25, 31, 41
Facilitating Inquiry in the Classroom Fred E. Newton, Northwest Regional Educational Laboratory	Copy-Print Centers 1208 S.W. Jefferson Street Portland, Oregon 97201	77 27, 31 41
Films on Cognitive Development Ruth Formanek and Greta Morine	Forward Looking Films RFD #1 State Line, Massachusetts 01261	79 33, 37, 45
*Guided Self-Analysis - Language Development Theodore Parsons	Guided Self-Analysis Professional Development Systems 2140 Shattuck Berkeley, California	117
Guided Self-Analysis: Teaching for Inquiry Theodore Parsons	Guided Self-Analysis Professional Development Systems 2140 Shattuck Berkeley, California 94704	80 33, 51
Human Relations Training Unit Far West Laboratory for Research and Development	Anti-Defamation League 315 Lexington Avenue New York, New York 10016	82 35
Information Units Far West Laboratory for Research and Development	Lockheed Education Systems P.O. Box 504 Sunnyvale, California 94088	83 35
Inner-City Simulation Laboratory Donald Cruickshank	Science Research Associates 259 East Erie Street Chicago, Illinois 60611	84 35
Instructional Design A Self-Directed Learning Program David P. Butts	Research and Development Center for Teacher Education University of Texas Austin, Texas	86 29

Title and Author/Developer	Source	Page
Intellectual Development of Babies Ruth Formanek and Greta Morine	Forward Looking Films RFD #1 State Line, Massachusetts 01261	87 33,45
Interaction Analysis John H. Hanson and Robert A. Anderson	Northwest Regional Educational Laboratory 710 S.W. Second Avenue 500 Lindsay Building Portland, Oregon 97204	88 33,51
Interpersonal Communications John Wallen	Northwest Regional Educational Laboratory 710 S.W. Second Avenue 500 Lindsay Building Portland, Oregon 97204	90 27, 51
Introduction to Early Childhood Education Verna Hildebrand	The Macmillan Company 866 Third Avenue New York, New York 10022	91 33, 41
Learning Interaction Analysis: A Programmed Approach Miles C. Olson	Educational Consulting Association, Inc. 3311 South Broadway, Suite 304 Englewood, Colorado 80110	92 33, 51
*Meeting Your Cooperating Teacher	Research and Development Center for Teacher Education University of Texas Austin, Texas	118
*Micro-Counseling Allen C. Ivey University of Massachusetts	University of Massachusetts Amherst, Massachusetts	118
Minicourse on Effective Questioning in a Classroom Discussion (Elementary) Far West Laboratory for Research and Development	Macmillan Educational Services, Inc. 8701 Wilshire Boulevard Beverly Hills, California 90211	93 23
Minicourse on Individualizing Instruction in Mathematics Far West Laboratory for Research and Development	Macmillan Educational Services, Inc. 8701 Wilshire Boulevard Beverly Hills, California 90211	94 23, 29 41

Title and Author/Developer	Source	Page
Minicourse on Organizing the Kindergarten for Independent Learning and Small-Group Instruction Far West Laboratory for Research and Development	Dr. L. Hutchins Far West Laboratory for Research and Development 1 Garden Circle Hotel Claremont Berkeley, California 94705	95 29
Minicourse on Thought and Language: Skills for Teaching the Child With Minimal Language Development Far West Laboratory for Research and Development	Dr. L. Hutchins Far West Laboratory for Research and Development 1 Garden Circle Hotel Claremont Berkeley, California 94705	96 23, 41
*Models of Teaching: Self-Instructional Modules Bruce Joyce, Marsha Weil, Rhoada Wald	Bruce Joyce Teachers College, Columbia University New York, New York 10027	119
Modifying Classroom Behavior Nancy Backley and Will Walker	Research Press Company Champaign, Illinois 61820	97 31, 45
Mr. Land's 6th Grade (Simulation Films) Bert Kersh	Dean Bert Kersh Oregon College of Education Monmouth, Oregon 97361	98
*Organizational Constraints (Games and Simulations)	Research and Development Center for Teacher Education University of Texas Austin, Texas	120
*Performance-Based Curriculum in Human Relations Allen C. Ivey University of Massachusetts	University of Massachusetts Amherst, Massachusetts	120
*Precision-Teaching: A Tool for the School Counselor and Teacher Ogden R. Lindsley	Ann Duncan Yeshiva University New York, New York	121
*PPIT - Principles and Practice of Instructional Technology	General Programmed Teaching P.O. Box 402 Palo Alto, California 94302	121

Title and Author/Developer	Source	Page
Professional Decision-Making for Teachers Bert Alfrey, Ron G. Joekel, Alan Seagren University of Nebraska	Nebraska Educational Television Council for Higher Education, Inc. Lincoln, Nebraska 68508	99 35, 49
*Programmed Instruction Educational Media Laboratories	Technifax Education Division The Plastic Coating Corporation Holyoke, Massachusetts 01040	121
The Psychology of Learning and Instruction: Educational Psychology John P. De Cecco	Prentice-Hall Englewood Cliffs, New Jersey	100 45
RUPS: Research Utilizing Problem-Solving Charles Jung, René Pino and Ruth Emory	Copy-Print Centers 1206 S.W. Jefferson Street Portland, Oregon 97201	101 35
*The Sensitivity Training Program Bruce Joyce, David E. Hunt, Harry Schroeder	Bruce Joyce Teachers College, Columbia University 525 West 120th Street New York, New York 10027	122
Social Studies Modules, Making a Living Miss Clyde I. Martin	Research and Development Center for Teacher Education University of Texas Austin, Texas	102 41
Systematic and Objective Analysis of Instruction James R. Hale and R. Allan Spanjer	Northwest Regional Educational Laboratory 710 S.W. Second Avenue 500 Lindsay Building Portland, Oregon 97204	103 27, 51
Teaching Achievement Motivation Alfred S. Alschuler, Diane Tabor, James McIntyre	Education Ventures, Inc. 209 Court Street Middletown, Conn. 06457	104 31, 45
Teaching for Problem-Solving: A Teaching Laboratory Manual Thomas B. Gregory	Research and Development Center for Teacher Education University of Texas Austin, Texas	105 27, 31
Teaching in IPI (Individually Prescribed Instruction) Mathematics	Research for Better Schools 1700 Market Street Philadelphia, Pennsylvania	107 29, 37, 41

Title and Author/Developer	Source	Page
The Teaching of Science: A Self-Directed Learning Program David P. Butts, Gene E. Hall	Research and Development Center for Teacher Education University of Texas Austin, Texas	108 29, 41
Teaching Skills for Elementary and Secondary School Teachers Dwight Allen, Kevin A. Ryan, Robert N. Bush, and James M. Cooper	General Learning Corporation 3 East 54th Street New York, New York 10022	110 21, 23, 25
*Team Teaching in the Elementary School	IDEA Information and Services Division P.O. Box 446 Melbourne, Florida 32901	122
Team Teaching Modules L. Jean York	The Leslie Press 111 Leslie Street Dallas, Texas 75207	112 37, 43, 49
*Techniques of Evaluating Types of Literature Educational Media Laboratories	Technifax Education Division The Plastic Coating Corporation Holyoke, Massachusetts 01040	123
*Training Competency-Based Instructional Personnel	Dr. George Dickson Dean, College of Education University of Toledo Toledo, Ohio 43606	123
Using Tests Intelligently Quentin Stodola	Mr. Donel Price, Director Broadcast Service Center California State College 5151 State College Drive Los Angeles, California 90032	114 37, 45
Vimcet Filmstrip-Tape Programs	Vimcet Associates P.O. Box 24714 Los Angeles, California 90024	115 23, 25, 39, 43

A CLASSIFICATION OF COMPETENCY-ORIENTED MATERIALS FOR TEACHER EDUCATION

1. Basic Interactive Teaching Skills

    General Communication and Presentation Skills
    Questioning Skills (Modulating Cognitive Level and General Discussion)
    Structuring
    Sanctioning
    Problem-Solving (Inquiry)
    Group Dynamics (Interpersonal Communication Skills)

2. Instructional Planning and Design Skills
3. Teaching Strategies
4. Analysis of Classroom Activities: Observation Guides and Interaction Systems
5. Instructional Decision-making (Problem-solving)
6. Student Diagnosis and Evaluation
7. Content Areas
8. Foundations of Education
9. Media and Instructional Technology
10. Educational Staffing and Instructional Organization
11. Staff Development

BASIC INTERACTIVE TEACHING SKILLS

	Behavioral Status					Objectives					Instructional Format					Administration			
	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych	Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing	Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
General Communication and Presentation Skills																			
1. Basic Teaching Tasks:A Teaching Laboratory Manual for Beginning Teacher Candidates --Clarity of Instructional Objective --Presentation (introducing, organizing, using audio-visual aids, closing, making assignments) --Refocusing		x		x	x		x					x					x		
2. Teaching Skills-Presentation Skills --Completeness of Communication --Lecturing --Use of Examples --Planned Repetition		x		x	x		x					x		x		x	x		
3. Teaching Skills-Response Repertoire --Verbal Responses --Non-verbal Responses --Combined Verbal and Non-verbal		x		x	x		x					x		x		x	x		
Questioning Skills (Modulating Cognitive Level and General Discussion)																			
1. Basic Teaching Tasks:A Teaching Laboratory Manual for Beginning Teacher Candidates --Interaction --Questioning as a classroom strategy		x		x	x		x					x					x		
2. Development of Higher Level Thinking Abilities --Questioning Strategies and Discussion Skills		x			x		x				x	x	x					x	
3. Guided Self-Analysis: Teaching for Inquiry		x			x	x	x				x			x	x	x		x	x

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	Behavioral Status					Objectives					Instructional Format					Administration			
	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych	Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing	Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
4. Minicourse on Effective Questioning in a Classroom Discussion (Elementary)					x	x	x				x			x		x			
5. Minicourse on Effective Questioning in a Classroom Discussion (Secondary)					x	x	x				x			x		x			
6. Minicourse on Individualizing Instruction in Mathematics					x	x	x				x			x		x			
7. Minicourse on Thought and Language: Skills for Teaching the Child With Minimal Language Development					x	x	x				x			x		x			
8. Teaching Skills-Questioning Skills (Secondary) --Fluency in Asking Questions --Probing Questions --Higher Order Questions --Divergent Questions		x		x	x		x					x		x		x	x		
9. Teaching Skills-Questioning Skills (Elementary)		x		x	x		x					x		x		x	x		
Structuring																			
1. Guided Self-Analysis: Teaching for Inquiry		x			x	x	x				x			x	x	x		x	x
2. Minicourse on Individualizing Instruction in Mathematics					x	x	x				x			x		x			
3. Teaching Skills-Creating Student Involvement --Set Induction --Closure		x		x	x		x					x		x		x	x		
4. Vimcet Filmstrip-Tape Program #6 (Set Induction)	x					x								x		x			

	Behavioral Status					Objectives					Instructional Format					Administration			
	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych	Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing	Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
Sanctioning (Reinforcement)																			
1. Basic Teaching Tasks: A Teaching Laboratory Manual for Beginning Teacher Candidates --Interaction		x		x	x		x					x					x		
2. Discovery Teaching Simulation System, Phase II --Indirect Guidance and Encouragement --Reinforcement of Exploration				x	x		x					x							x
3. Distar Series: Training Teachers and Paraprofessionals in Englemann-Becker Follow-Through Classrooms		x		x	x	x	x					x	x	x				x	
4. Guided Self-Analysis: Teaching for Inquiry		x			x	x	x				x			x	x	x		x	x
5. Teaching Skills-Increasing Student Participation --Reinforcement --Recognizing Attending Behavior --Silence and Non-verbal Cues --Cueing		x		x	x		x					x		x		x	x		
6. Vimcet Filmstrip-Tape Programs #12 Knowledge of Results #15 Discipline in the Classroom (Beh. Mod.)	x					x								x		x	x		
Problem-solving (Inquiry)																			
1. Development of Higher Level Thinking Abilities --Interpretation of Data --Application of Knowledge		x			x		x				x	x	x						x

	Behavioral Status					Objectives					Instructional Format					Administration			
	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych	Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing	Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
2. Discovery Teaching Simulation System, Phase I; Phase II --Focusing on the Problem --Springboards				x	x	x	x					x		x			x	x	
3. Facilitating Inquiry in the Classroom					x		x						x					x	
4. Guided Self-Analysis: Teaching for Inquiry		x			x	x	x				x			x	x	x		x	x
5. Teaching for Problem Solving: A Teaching Laboratory Manual --Creating Incongruity: Presenting the Problem --Attacking Incongruity: Formulating Hypotheses				x	x		x					x						x	
Group Dynamics (Interpersonal Communication Skills)																			
1. Interpersonal Communications					x	x	x						x				x		
2. Systematic and Objective Analysis of Instruction (Phase One)					x	x	x					x	x	x	x				x

INSTRUCTIONAL PLANNING AND DESIGN SKILLS

Categories:
1. Determining Instructional Objectives
2. Instructional Activities (deriving content and planning lessons)
3. Appraisal and Assessment
4. Individualizing for Instruction
5. Grouping

	Behavioral Status					Objectives					Instructional Format					Administration			
	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych	Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing	Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
1. Basic Teaching Tasks: A Teaching Laboratory Manual for Beginning Teacher Candidates --Clarity of instructional objectives (1,2)		x		x	x		x				x						x		
2. Competencies in Mathematics (1,2,3)					x	x									x	x			x
3. Developing Effective Instruction (1,2,3)	x					x								x		x			
4. Development of Higher Level Thinking Abilities (1,2)		x			x		x				x	x	x					x	
5. Instructional Design: A Self-Directed Learning Program (1,2,3)					x	x									x	x			
6. Minicourse on Individualizing Instruction in Mathematics (1,2,3,4)					x	x	x				x			x		x			
7. Minicourse on Organizing the Primary Classroom for Independent Learning and Small Group Instruction (4,5)					x	x	x					x		x	x				
8. Teaching in IPI Mathematics, Vols. One and Two (4)	x					x									x	x			
9. The Teaching of Science: A Self-Directed Learning Program (Instructional Design for Science Teaching) (2,3)																			

	Behavioral Status					Objectives					Instructional Format					Administration			
	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych	Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing	Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
10. Team Teaching Modules --Module III (2) --Modules V and VI (4) --Modules IV (5)					x	x								x		x			
11. Vimcet Filmstrip-Tape Program #1 (1) #9 (2) #18 (3) #2 (3) #10 (2) #6 (2) #3 (1) #11 (2) #4 (1) #13 (2) #5 (2) #14 (2) #7 (3) #16 (3) #8 (2) #17 (2)	x					x								x		x	x		

TEACHING STRATEGIES

	Behavioral Status					Objectives					Instructional Format					Administration			
	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych	Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing	Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
1. The Basic Course: Teaching is Learning to Listen; and Activities in Metaphor		x		x	x	x									x	x			
2. Basic Teaching Tasks: A Teaching Laboratory Manual for Beginning Teacher Candidates --Presentation (The active lecture)		x		x	x		x					x					x		
3. Competencies in Mathematics --Instructional Strategies: Division --Instructional Strategies: Numeration					x	x									x	x			
4. Development of Higher Level Thinking Abilities		x			x		x				x	x	x					x	
5. Distar Series: Training Teachers and Paraprofessionals in Englemann-Becker Follow-Through Classrooms		x		x	x	x	x					x	x	x				x	
6. Facilitating Inquiry in the Classroom					x		x						x					x	
7. Modifying Classroom Behavior		x			x	x									x	x			
8. Teaching Achievement Motivation	x								x			x	x		x		x		
9. Teaching for Problem-Solving: A Teaching Laboratory Manual				x	x		x					x					x		

ANALYSIS OF CLASSROOM ACTIVITIES: OBSERVATION GUIDES AND INTERACTION SYSTEMS

Categories:
1. Comprehensive Pupil-Teacher Interaction Patterns
2. Pupil-Teacher Interaction: Socio-Emotional Climate
3. Teacher Questioning Patterns
4. Teacher Response Patterns
5. Child Behavior Patterns
6. Teaching Strategy
7. General Observation Guide
8. Levels of Thinking

	Behavioral Status					Objectives					Instructional Format					Administration			
	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych	Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing	Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
1. Analysis of Teaching Behavior (Science Teaching) (1,2)			x		x	x					x		x					x	
2. Classroom Behavior Analysis and Treatment (5,4)		x	x		x	x	x							x				x	
3. Discovering New Dimensions in the Teaching Process (1,3,4,6,8)		x			x	x	x				x			x		x		x	
4. Films on Cognitive Development (5)		x		x	x	x								x			x	x	
5. Guided Self-Analysis: Teaching for Inquiry (3,4,1,8)		x			x	x	x				x			x	x	x		x	x
6. Intellectual Development of Babies (5)		x	x		x	x								x		x		x	
7. Interaction Analysis (2)					x		x							x				x	
8. Introduction to Early Childhood Education (7)			x		x	x			x					x		x	x		
9. Learning Interaction Analysis: A Programmed Approach (2)		x			x	x								x		x			

INSTRUCTIONAL DECISION-MAKING
(Problem-solving)

Categories:
1. Human Relations
2. Teaching Style, Skill or Methods
3. Students with Academic Problems
4. Students with Personal Difficulties
5. Cultural Conflict
6. Grading
7. Classroom Organization
8. Classroom Management
9. Educational Staffing and School Organization
10. School/Community Relations
11. Curriculum

	Behavioral Status					Objectives					Instructional Format					Administration			
	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych	Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing	Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
1. Classroom Management Simulation System (8)					x	x						x				x		x	
2. Critical Moments in Teaching (1,2,3,4,5,6,7,8)		x	x		x	x							x				x		
3. The Discovery Teaching Game (2)	x					x			x				x						x
4. Human Relations Training Unit (1,5,7,8,10--particularly oriented toward inner city)		x	x		x					x		x	x					x	x
5. Information Units (11)		x	x		x	x			x			x			x	x	x		
6. Inner-City Simulation Laboratory (1,2,3,4,5,7,8,10)		x		x	x	x							x	x			x		x
7. Professional Decision-making for Teachers (1,2,3,6,8,10)		x	x		x	x							x				x		
8. RUPS: Research Utilizing Problem-Solving (7,8)					x	x	x						x					x	

STUDENT DIAGNOSIS AND EVALUATION

	Behavioral Status					Objectives					Instructional Format					Administration			
	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych	Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing	Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
1. Classroom Behavior Analysis and Treatment		x	x		x	x	x							x				x	
2. Competencies in Mathematics- "Assessing Student Behavior"		x	x		x	x									x	x			
3. Competencies in Mathematics- "Diagnosing Student Difficulties"		x	x		x	x									x	x			
4. Developing Effective Instruction --Criterion Tests --Determining Entry Level --Entry Level --Tests -Validation	x					x								x		x			
5. Development of Higher Level Thinking Abilities --Concept Diagnosis		x			x		x				x	x	x					x	
6. Films on Cognitive Development		x		x	x	x								x			x	x	
7. Teaching in IPI Mathematics --Vol. 3: Diagnosing Student Achievement --Vols. 4,5,6: Developing Prescriptions--Three Cases	x					x									x	x			
8. Team Teaching Modules --Module VI: Evaluation of Team Teaching and Children's Continuous Progress, Team Teaching Modules					x	x								x		x			
9. Using Tests Intelligently	x					x								x					x

CONTENT AREAS

	Behavioral Status						Objectives						Instructional Format						Administration			
	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.		Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych		Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing		Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
1. Competencies in Mathematics					x		x										x		x			
2. Development of Higher Level Thinking Abilities --Social Studies		x			x			x					x	x	x						x	
3. Distar Series: Training Teachers and Paraprofessionals in Englemann-Becker Follow-Through Classrooms --Reading --Language --Mathematics		x		x	x		x	x						x	x	x					x	
4. Facilitating Inquiry in the Classroom (Science)					x			x							x						x	
5. Introduction to Early Childhood Education: A Laboratory Workbook			x		x		x			x						x			x	x		
6. Minicourse on Individualizing Instruction in Mathematics					x		x	x					x			x			x			
7. Minicourse on Thought and Language: Skills for Teaching the Child with Minimal Language Development					x		x	x					x			x			x			
8. Social Studies Modules, Making a Living		x		x	x		x									x	x			x		
9. Teaching in IPI Mathematics	x						x										x		x			
10. The Teaching of Science: A Self-Directed Learning Program	x							x						x			x		x			x

FOUNDATIONS OF EDUCATION

	Behavioral Status					Objectives					Instructional Format					Administration			
Psychology (Educational Psychology, Child Development)	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych	Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing	Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
1. Critical Moments in Teaching and Guide for Independent Discussion and Study		x	x		x	x							x				x		
2. Distar Series: Training Teachers and Paraprofessionals in Englemann-Becker Follow-Through Classrooms		x		x	x	x	x					x	x	x				x	
3. Films on Cognitive Development		x		x	x	x								x			x	x	
4. Intellectual Development of Babies		x	x		x	x								x		x		x	
5. Modifying Classroom Behavior		x			x	x									x	x			
6. Teaching Achievement Motivation	x								x			x	x		x		x		
7. Using Tests Intelligently	x					x								x					x
8. The Psychology of Learning and Instruction: Educational Psychology					x	x							x		x	x		x	

MEDIA AND INSTRUCTIONAL TECHNOLOGY

	Behavioral Status					Objectives					Instructional Format					Administration			
	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych	Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing	Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
1. Cameras in Education		x	x		x		x							x				x	
2. Developing Effective Instruction --Development and administration of programmed materials	x					x								x		x			

EDUCATIONAL STAFFING AND INSTRUCTIONAL ORGANIZATION

	Behavioral Status					Objectives					Instructional Format					Administration			
	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych	Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing	Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
1. Professional Decision-Making for Teachers		x	x		x	x							x				x		
2. Team Teaching Modules					x	x									x	x			

STAFF DEVELOPMENT

Categories: 1. General Interpersonal Skills 2. Supervisory Skills	Behavioral Status					Objectives					Instructional Format					Administration			
	Complete	Need specif. of obj.	Need Assessm. Meas.	A.M. need refining	Need Level of Perf.	Cognitive	Demonstrative	Consequential	Expressive	Affective-Psych	Micro-Teaching	Simu. Teaching/Roleplay	Group Discussion	Observ-Writing	Reading-Writing	Self-Ad (Indiv)	Self-Ad (Group)	Instructor	Coordinator
1. Analysis of Teaching Behavior (2)			x		x	x					x		x					x	
2. The Assessment Training Kit		x		x	x	x									x	x			
3. Classroom Behavior Analysis and Treatment (2)		x	x		x	x	x							x				x	
4. Discovering New Dimensions in the Teaching Process		x			x	x	x				x			x		x		x	
5. Guided Self-Analysis: Teaching for Inquiry (2)		x			x		x				x			x				x	
6. Interaction Analysis (2)					x		x							x				x	
7. Interpersonal Communications (1)					x	x	x						x				x		
8. Learning Interaction Analysis: A Programmed Approach (2)		x			x	x								x		x			
9. Systematic and Objective Analysis of Instruction (2)					x	x	x					x	x	x	x				x

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